Natures Way Cooperative (Fiji) Ltd : A Case Study of Agriculture for Growth in the Pacific

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Contents

1 Acronyms

ACIAR	Australian Centre for International Agriculture Research
AoA	Agreement on Agriculture (WTO)
AMA	Agricultural Marketing Authority
ATS	Air Terminal Services
AQIS	Australian Quarantine Inspection Service
AusAID	Australian Agency for International Development
BQA	Bilateral Quarantine Agreement
CAD	Commercial Agricultural Development Project (USAID)
CAFF	Civil Aviation Authority of Fiji
ECF	Enterprise Challenge Fund - AusAID
EDB	Ethyl dibromide
FACT	Facilitation Agricultural Commodity Trade – EU/SPC
FDB	Fiji Development Bank
FIRCA	Fiji Islands Revenue Customs Authority
FQIS	Fiji Quarantine Inspection Service
GAP	Good Agricultural Practice
GMO	Genetically Modified Organism
HACCP	Hazard Analysis and Critical Control Points
HTFA	High Temperature Forced Air
MAFF	Ministry of Agriculture Forests and Fisheries
MASRL	Ministry of Agriculture Sugar and Resettlement
NWC	Natures Way Cooperative (Fiji) Ltd.
PEDF	Pacific Enterprise Development Facility – International Finance Corporation
PIC	Pacific Island Countries
PPP	Public Private Partnership
PRSV	Papaya Ringspot Virus
SDC	Southern Development Company

SPC	Secretariat of the Pacific Community
SPPF	South Pacific Project Facility – International Finance Corporation
TTM	Taiwan Technical Mission
QTI	Quarantine Technologies International
USAID	United States Agency for International Development
USDA	United States Department of Agriculture

2 Exchange Rates

Middle market rate per Fiji dollar (FJD)

End of period	USD	AUD	NZD
2005	0.5731	0.7827	0.8409
2006	0.6009	0.7605	0.8521
2007	0.6477	0.7352	0.315
2008	0.5669	0.8201	0.9818
June 2009	0.4871	0.6027	0.7488

Source: Reserve Bank of Fiji

3 Executive Summary

Despite identified market opportunities, the Pacific island countries (PICs) have not been a part of the global horticulture revolution. Fiji is finally starting to prove an exception to the rule, with horticultural exports becoming a lead growth sector. This coincides with the demise of the Fiji sugar industry and where the diversification of export and rural livelihood opportunities is urgently required if a major calamity is to be avoided.

An industry owned business, Natures Way Cooperative (Fiji) Ltd, the focus of this case study, is playing a lead role in the development of this new growth export industry. NWC is a registered cooperative owned and operated by the Fiji fresh produce export industry. NWC's core business is the quarantine treatment of fruit fly host products. Over the last decade NWC has grown from a small business handling just 30 tonnes of papaya to an agribusiness treating 1,200 tonnes fruit (papaya, mango, eggplant and breadfruit) annually for export. Currently NWC annually generates around FJD 2million in export earnings and FJD 800,000 in farmer income. Because of the capital investment made by NWC a threefold increase in export earnings and farmer income is now feasible.

A number of key factors have contributed the success of NWC. These are:

- The quality and continuity of management.
- There has been no government interference in the operations of the business.
- An appropriate public private sector partnership.
- Shareholders have not interfered in the day to day operations.
- Quarantine treatment fees have been set at an economic rate from the outset - enabling the business to met operating costs, fund repairs and maintenance, invest in expansion and make "rainy day" provisions for events such as cyclones and trade bans.
- The business was able to quickly move to a level of plant utilisation that yielded to a positive cash flow.

Successful quarantine treatment in the Pacific Islands requires a public private sector partnership (PPP). The public sector cannot be successful on its own nor can the private sector. However, through appropriately collaboration, success can be achieved. The appropriate role and contribution of the two parties in the PPP are:

<u>The public sector</u>:

- Facilitates the initial transfer of specialised technology to the fruit and vegetable export industry.
- Provides start-up capital (equipment, building, land and some working capital) and contributions toward expansion projects in the form of capital.
- Facilitates the timely negotiation of bilateral quarantine agreements (BQAs) that open up markets for the business.

<u>The private sector</u>:

- Owns and operates the facility on behalf of the fruit and vegetable export industry.
- Provides a significant contribution for the start-up and working capital by taking shares in the business.
- Generates the retained earnings to maintain the business and to invest in future expansion.

Operating as a formal registered cooperative has served the quarantine treatment business reasonably well in its 13 years of operation. There have been two major benefits to this structure:

- Under Fiji Cooperative Act, a new cooperative is entitled to a 7 year tax holiday.

- There has been a steady increase in exporter members of NWC. A principle objective of the cooperative is to expand its membership. This would not necessarily be the case for a limited liability company providing services.

However, there have been a number of short comings and problems arising from NWC being a cooperative.

- A generally negative perception of cooperatives.
- Inadequate administrative support provided by the Department of Cooperatives.
- Under capitalization.
- The risk of unjustified change of management.

NWC has grown from a small service cooperative to a mature agribusiness whose turnover will soon exceed a million dollars annually. The longer term sustainability of the business depends on being able to:

- maintain a high level of retained earnings;
- to attract more equity investment on the part of its shareholders;
- maintain high quality management that make decisions that are in the long term interest of the industry; and,
- having an effective credit control system in place for the recovery of debtor payments

The first three of these objectives would be more likely to be achieved if NWC was a limited liability company, under the Companies Act, with the exporters and farmers as shareholders,

With the completion of the current capital investment program NWC will theoretically have the capacity to treat around 3, 800 tonnes per annum. A realistic maximum capacity is likely to be more in the order of 3,000 tonnes per annum.

With the Fiji fresh fruit and vegetable export industry starting to realise its potential, treatment requirements may in the not too distant future exceed this expanded capacity. However, NWC has decided not to make any more investments in treatment capacity. The argument was that if treatments exceeded 3,000 tonnes per annum, the larger exporters would have sufficient throughput to invest in their own treatment facilities.

The success of Natures Way has created pressure to replicate the facility in two other locations – one in the remote northern island of Rotuma and the other on the Eastern side of the main island of Viti Levu. Neither of these ventures has been subject to an economic feasibility study and it is highly unlikely that either could be commercially viable, with the throughput unlikely to justify the capital investment. This contrasts markedly to the situation at NWC, where the initial investment and subsequent expansion were subject to detailed feasibility studies.

NWC's core business has been quarantine treatment. However, there have been opportunities to take advantage of NWC's strategic position to raise funds to undertake other service activities on behalf of the horticultural export industry. Such activities should not undermine NWC's ability to provide efficient quarantine treatment services. The Cooperative has been very successful in accessing donor funding to support the establishment of these service role activities. Examples of such service activity roles are:

- A body representing the needs of the horticultural export industry
- Operating a field service
- Market access facilitation
- Input supplies (field crates and seedlings)

4 Introduction

With the demise of the Fiji sugar industry, diversification of export and rural livelihood opportunities is urgently required if a major calamity is to be avoided. In line with global trends, horticultural exports have been identified as one of the most promising diversification avenues for Fiji. Export horticulture is now, after years of disappointment, the fastest growing part of Fiji's agricultural sector. In this respect, Fiji stands out from other Pacific island countries. An industry owned business, Natures Way Cooperative (Fiji) Ltd, the focus of this case study, is playing a lead role in the development of this new growth export industry.

4.1 The Fiji economy and agricultural sector

The performance of Fiji's economy since independence has been sluggish and unstable (table 1). Periods of modest growth have been punctuated by coups and economic contraction. This poor economic performance has been associated with a decline in Fiji's ranking on the UN Development Programme's Human Development Index. Fiji has fallen from 44thposition in 1996 to 103 in 2006 (UNDP 2001, 2008). Over the last decade Fiji has become the poorest performer in terms of growth of all Pacific island economies (table 2)

Table 1: Fiji macroeconomic indicators, 1971-2008

	1971-86	1987-90	1991-99	2000	2001-05	2006-08
Average annual real GDP growth (%)	4.14	- 0.94	2.76	-1.66	2.45	-1.0
Average annual Inflation rate (%)	3.53	6.56	3.7	3.0	2.82	5.0
Unemployment rate (%)	8.9	7.5	6.4	7.6	8.2	8.6

Source: Mahadevan (2009) Reserve Bank of Fiji, Quarterly Review (Various Issues)

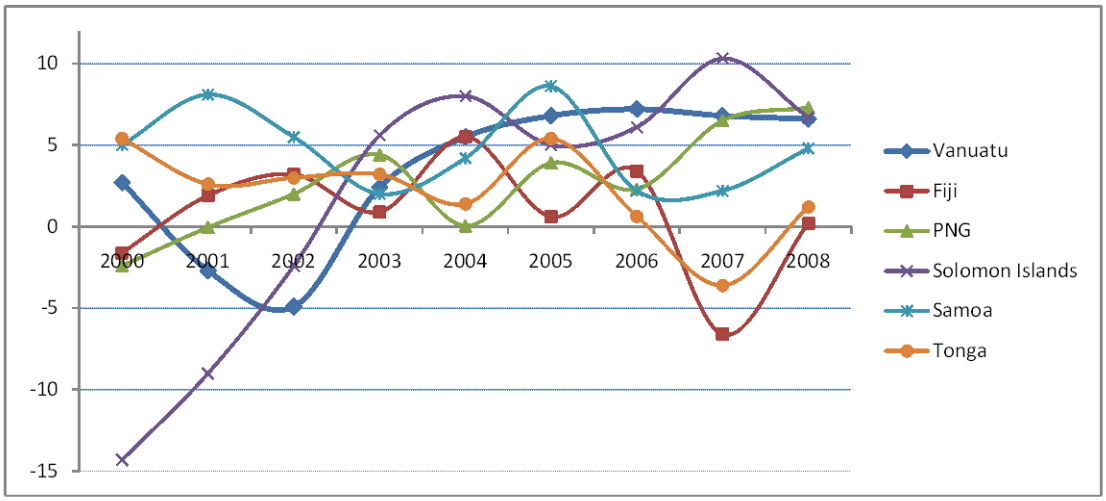
4.2 Fiji's agricultural industries

4.2.1 An overview

Until recently, GDP contribution and the foreign exchange earnings of the agricultural sector have remained fairly constant. However, it is now beginning to decline with the contracting of the sugar sector. The sector remains the main source of employment, although agricultural workers are frequently under-employed. Despite substantial government and aid expenditure in various agricultural development projects, the overall pattern of production has changed little. The structure of the various agricultural sub-sectors, their performance and contribution to the economy are presented in Table 3. Sugar cane production and subsistence remain the dominant activities in the agricultural sector.

Table 2: Comparative real GDP growth performance of the Fiji economy, 2000-2008 (annual % change)

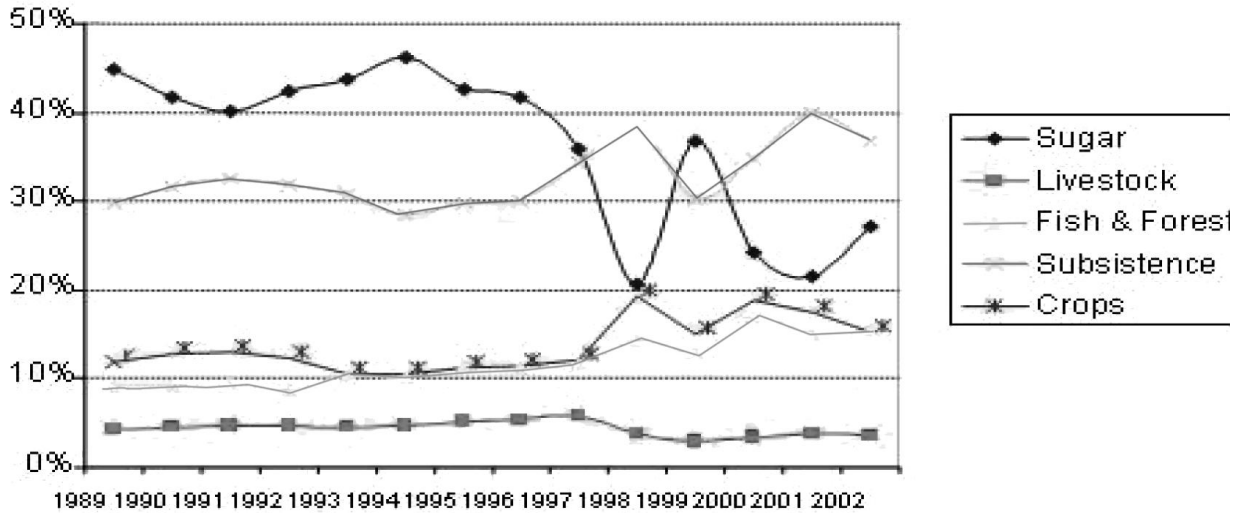
	2000	2001	2002	2003	2004	2005	2006	2007	2008	Av. over period
Vanuatu	2.7	-2.7	-4.9	2.4	5.5	6.8	7.2	6.8	6.6	4.63
Fiji	**-1.6**	**1.9**	**3.2**	**0.9**	**5.5**	**0.6**	**3.4**	**-6.6**	**0.2**	**0.94**
PNG	-2.4	-0.05	2	4.4	0.05	3.9	2.3	6.5	7.3	3.00
Solomon Islands	-14.3	-9	-2.4	5.6	8	5	6.1	10.3	6.7	2.00
Samoa	5	8.1	5.5	2	4.2	8.6	2.2	2.2	4.8	5.33
Tonga	5.4	2.6	3	3.2	1.4	5.4	0.64	-3.6	1.21	2.41



Source: Central Bank and IMF Statistics

The contribution of subsistence production to GDP is similar to that of sugar (average of 40% of total agricultural GDP at current prices) as shown in Figure 1. Sugar's share of GDP has been falling over the last few years and can be expected to continue to fall. Farming systems and the crops grown have not changed over the last two decades.

Figure 1. Percentage of agriculture, forestry and fisheries GDP by activity (current prices at factor cost)



Source: Fiji Islands Bureau of Statistics

Table 3: Overall analysis of the performance of the Fiji agricultural sector and contribution to the economy*

Sub-sector	Value of production and trend	Foreign exchange earnings/or saving	Employment
Subsistence agriculture	30-40% of agricultural GDP - steady growth	Substantial as foreign exchange saving	Majority of economically active population
Sugar	FJD 250 - 300 million in decline	FJD 250 - 300 million	23,000 contract growers, 500 mill workers, and 17,000 cane cutters. These numbers areindecline with the non-renewal of leases and declining prices.
Other bulk export crops (copra and cocoa)	FJD 4 - 8 million, from copra production in decline	FJD 4 - 8 million - more than double this amount the value of coconuts in subsistence is taken into account	Large numbers earning meagre income
Horticulture and niche export crops	FJD 50 million. Becoming significant and growing quite rapidly	FJD 30 million	250,000 days of employment generated by ginger. Equivalent employment estimated for export of taro.
Commercial food crops	FJD 120 million steady growth	Equivalent to the value of production	70% of farms are non-sugar cane.
Rice	FJD 6 - 8 million was declining, now some increase	With most production now rainfed, almostequivalent to value of production	5,000 farmers grow rice, usually in rotation with sugar cane
Livestock	Poultry (7,700 tonnes FJD 35 million.- increasing) Dairy products (FJD 23 million.- declining) Beef (1,600 tonnes - declining) Pork (750 tonnes – steady) Sheep meat (25 tonnes)	Net savings small for poultry and pork and high for dairying and beef	Number of farms - Dairying 2,000 commercial - Beef 1,800 commercial - Pigs 14,500 - Poultry 1,000.

* Derived and updated from McGregor 2006

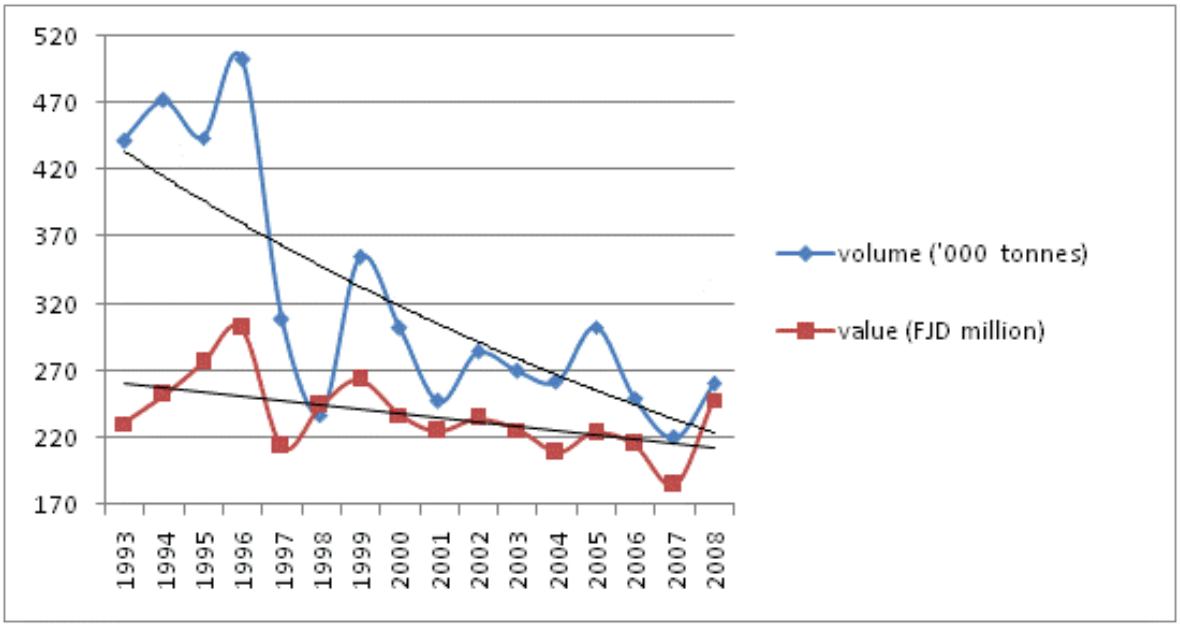
4.2.2 Commodity export industries – all in decline

Sugar - hitherto the mainstay of the economy

The last few years have seen a haphazard uncontrolled reduction in size of the sugar industry (figure 2). This has been the result of non-renewal of significant percentage of leases over the period 2000-05, and since 2006, with the decline in preferential prices received for sugar sold to

the EU[1]. The loss of the sugar industry would have catastrophic consequences for the economy and income distribution. Cane occupies over 50% of arable land. The industry directly employs 13% of the labour force, contributes around 9% of GDP and generates some 25% of total domestic exports (Mahadevan 2009). The surge in world market sugar prices during the course of 2009 has to some extent temporarily cushioned the impact of the declined EU price. However, the combination of low productivity and low prices means that many farmers are earning negative returns from growing sugar cane (annex 1). The milling of sugar cane is an activity with high overhead fixed costs. Thus as the volume of cane milled continues to fall the average milling costs has increased sharply resulting in substantial and increasing losses to the Fiji Sugar Corporation.

Figure 2: Fiji sugar exports, 1993-2008



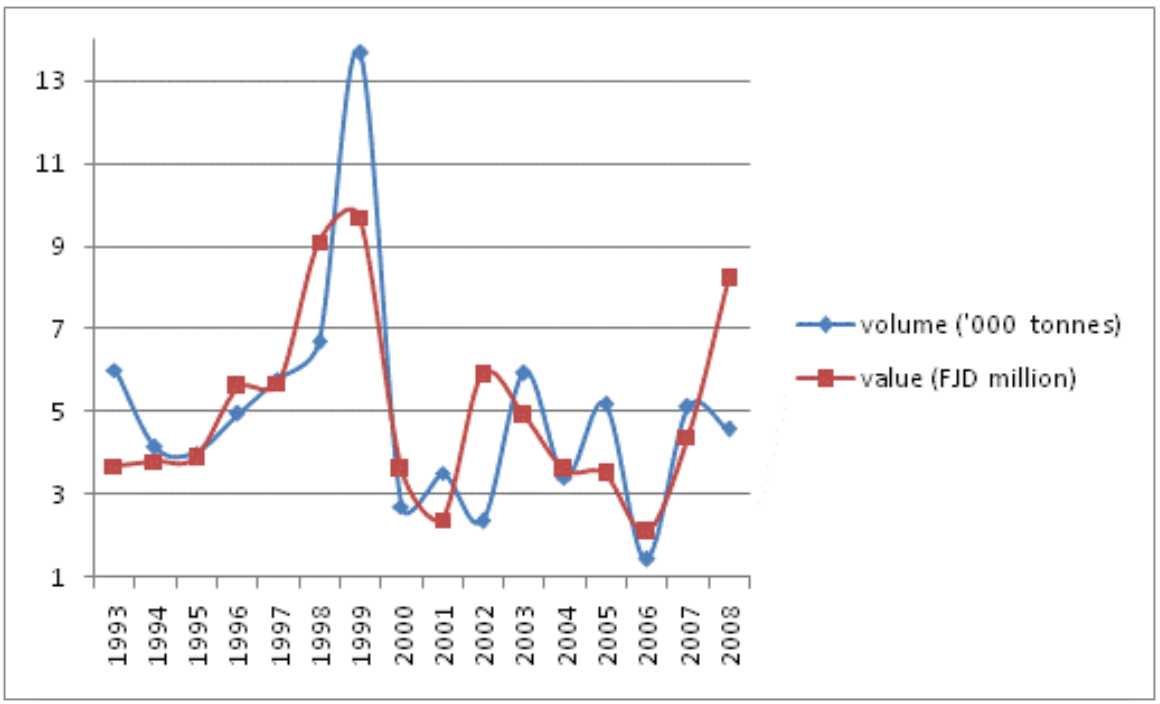
Copra –the traditional crop of the other islands

Copra, the traditional cash crop of Eastern Vanua Levu and the outer islands, has been in decline for the last three decades. Much of the total area under coconuts has been abandoned and there has been virtually no replanting. World prices for coconut oil were unfavourable on average, and the financial viability of the sector has relied on the intervention price mechanism supported by government. In export earnings, the last decade have seen the copra industry surpassed by ginger, kava and taro. A number of attempts to diversify have been made, but with little success. The occasional improvement in copra prices (e.g. 1995, 1999, 2005 and 2008) has lead to short term upturns in production with producers having an incentive to gather more of the nuts available.

[1] The successive cuts in the prices paid by the EU for ACP sugar sold under the Sugar Protocol of the Lome Convention have been:

- 2007 5.1%
- 2008 9.2%
- 2009 21.7%

Figure 3: Fiji coconut oil exports, 1993 - 2008



At its peak in the 1960s, the industry was producing around 40,000 tonnes of copra annually. In the early 1990s, production fell below 10,000 tonnes. Copra earnings now range from FJD4-FJD8m annually, which represents less than 1% of the value of total exports. Yet a significant number of rural households, with few alternatives, continue to earn a meagre income from copra. The last Agricultural Census (1999) showed that 57,000 rural households earn some income from copra. Approximately half of Fiji's copra comes from village farmers with the balance coming from mostly run down estates that have little to distinguish them from small farmers. In most years, a government subsidy is required to keep the majority of these growers in production.

4.2.3 Horticulture – the growing segment of Fiji's export agriculture

This entirely smallholder-based sub-sector includes ginger, tropical fruit, root crops and vegetables. Export horticulture is now, after years of disappointment, the fastest growing part of Fiji's agriculture sector.

This sub-sector is dominated by root crops (taro, cassava, ginger and kava), the total export value of which reached FJD38million in 2004 (table 4). The value of these exports is plotted in Figure 4. Tropical fruit, particularly papaya, is showing considerable promise and is the focus of this study. However Figure 4 starkly shows the chasm that still needs to be filled between declining sugar earnings and increasing horticultural export earnings. In 1998 there was a degree of euphoria in some quarters that the illusive replacement for sugar had been found, when kava export earnings jumped from FJD 3 million in 1997 to FJD 35 million in 2008. The kava boom was short lived, with the value exports plummeting to less than FJD 2 million over the next few years.

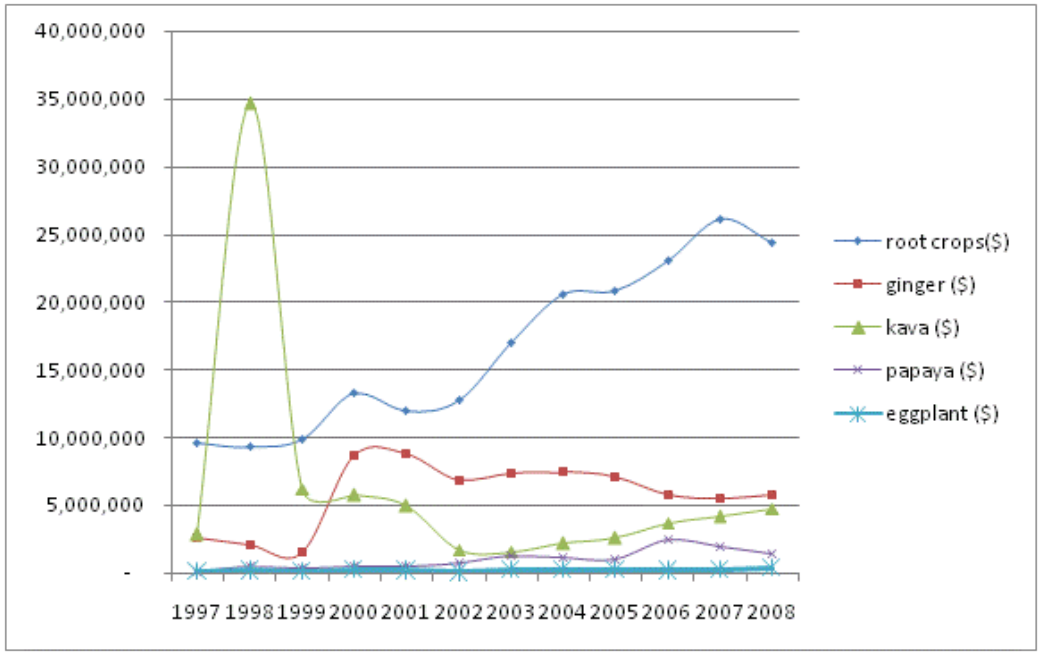
The continued growth in niche horticultural exports has confirmed the competitive advantage in this area of Fiji's agriculture, albeit nowhere near sufficient to offset the accelerating demise of the sugar industry. The value of sugar and molasses exports in 2008 was FJD262 million. The next biggest agricultural exports in that year were root crops valued at FJD26 million.

Table 4: Export of Fiji's major horticultural export commodities, 1997- 2008

	Taro		Cassava		Fresh Ginger		Processed Ginger		Total Ginger	Kava		Papaya		Eggplant		Total value
	kg	FJD	kg	FJD	kg	FJD	kg	FJD	FJD	kg	FJD	kg	FJD	kg	FJD	FJD
1997	6,040,130	9,023,963	421,919	504,983	821,117	1,517,093	258,085	1,062,601	2,579,694	363,709	2,865,913	24,067	83,272	113,665	135,733	15,193,558
1998	5,262,941	8,617,730	612,374	693,603	612,374	693,603	206,447	1,311,573	2,005,176	1,350,685	34,649,051	103,336	430,355	127,196	178,564	46,574,479
1999	4,967,861	8,935,709	816,948	919,056	484,506	803,867	84,058	687,726	1,491,593	412,283	6,193,896	61,822	332,188	56,659	63,312	17,935,754
2000	7,381,360	12,329,265	750,890	891,211	459,947	760,319	1,744,997	7,926,101	8,686,420	401,658	5,744,491	99,346	432,341	160,715	238,559	28,322,287
2001	6,020,609	10,274,669	937,198	1,707,992	189,285	1,066,097	1,154,559	7,756,790	8,822,887	385,070	4,989,400	116,055	523,870	82,671	152,286	26,471,104
2002	6,617,689	11,055,890	1,045,936	1,669,581	149,326	489,752	917,155	6,378,967	6,868,719	125,632	1,728,708	151,699	685,999	50,470	52,611	22,061,508
2003	9,007,650	14,943,504	1,582,659	2,075,575	208,485	696,513	973,619	6,685,092	7,381,605	142,445	1,565,730	207,227	1,238,708	107,831	210,440	27,415,562
2004	9,637,923	18,690,004	1,184,293	1,867,196	235,762	717,715	1,304,095	6,697,775	7,415,490	141,042	2,205,432	298,136	1,085,369	101,129	225,737	31,489,228
2005	9,959,468	19,006,178	1,799,063	1,819,772	506,515	1,868,972	1,026,757	5,249,114	7,118,086	122,619	2,553,667	284,211	994,351	86,427	199,467	31,691,521
2006	9,434,808	20,935,701	1,714,305	2,068,827	468,987	2,084,372	733,162	3,668,383	5,752,755	183,422	3,674,216	662,458	2,435,925	89,439	188,810	35,056,234
2007	11,949,411	23,647,269	1,709,949	2,441,155	414,404	1,858,519	813,807	3,615,833	5,474,352	174,162	4,153,247	463,396	1,993,739	99,263	194,492	37,904,254
2008	10,795,807	22,175,115	1,800,526	2,185,006	44,243	203,713	1,350,495	5,614,538	5,818,251	184,276	4,750,660	392,898	1,387,090	194,648	368,836	36,684,958

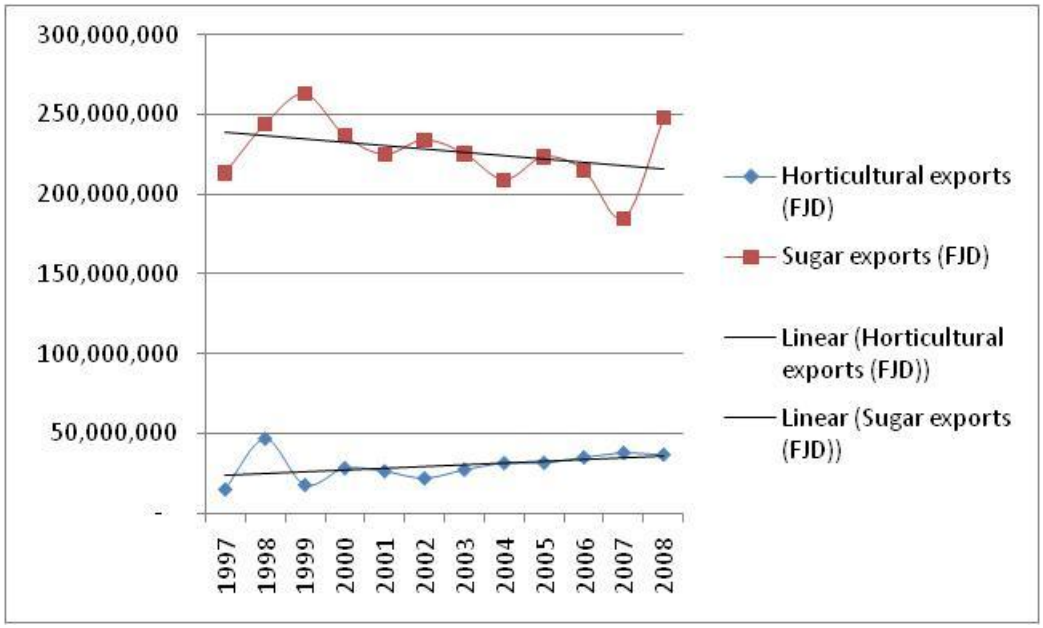
Source: Fiji Islands Bureau of Statistics

Figure 4: The value of Fiji horticultural exports, 1997 to 2008 (FJD)*



*Source: The Fiji Island Bureau of Statistics

Figure 5: A comparison of Fiji's horticulture and sugar exports 1997 to 2008 (FJD)



Export horticulture is highly labour intensive and absorbs a considerable amount of labour even when relatively small areas of land are involved. Estimates of the employment generated by the 6 major horticultural export industries are presented in table 5.

Table 5: A summary of estimated employment and labour absorption in Fiji's major horticultural export industries

Industry	Employment and labour absorption
Taro	According to the MASRL Annual Report, there were 32,365 farmers involved in dalo production in 2003. Only a small portion of these are involved in the growing of taro specifically for export markets. These are mainly located on the Island of Taveuni (Fiji's 3rd largest island). According to the records of the Agriculture Officer Taveuni, there are approximately 600 farm households that grow taro for export. According to farm management budgets, it requires 100 person days of labour to produce a tonne of exportable taro (McGregor and Gonemaituba2003, p. 86). Thus, 10, 000 tonnes of taro exports generates 1 million person days of on-farm employment, or around 3,000 full time job equivalents. An additional 1,000 job equivalent would be generated in the subsequent marketing and handling of taro.
Cassava	According to the MASRL Annual Report, there were 31,870 farmers involved in the production of 39,885 tonnes of cassava in 2003. However in that year, only 1,622 tonnes of cassava were exported in frozen form. This level of exports, taking account of losses and quality requirements, would need around 2,500 tonnes of cassava. Labour input requirements for cassava are about half that for taro (50 person days per tonne of cassava). Thus 2,500 tonnes of cassava grown for export, requires around 125,000 person days of on farm employment, or around 420 full time jobs. An additional 140 jobs would have been required in the subsequent marketing and handling of the taro.
Ginger	Ginger is a particularly labour intensive crop requiring only small areas of land. The 2004 MASRL Annual Report, indicates that that there are 383 farmers growing immature ginger and 205 growing mature ginger. Based on a comprehensive study of the industry, it is estimated that the ginger industry uses 250,000 days of farm labour annually (McGregor 1988). This represents around 800 full time on-farm jobs and potentially another 300 off farm jobs, particularly in the labour intensive processing sector.
Kava	Kava is a far less labour intensive crop than taro or ginger. The MASRL 2004 Annual

	Report indicates 18,554 kava growers producing 2,691 tonnes of kava in 2003. Most of this kava was consumed on the local market, with exports in that year being 144 tonnes. According to kava farm management budgets for the main kava producing island of Kadavu, one acre would produce 6.5 tonnes of dried kava over a 5-year period, or an average 1.3 tonnes per year (McGregor and Gonemaituba 2003, p. 88). The average annual labour requirement is 107 days. Thus, a tonne of kava requires 82 days of labour. In turn, to produce 150 tonnes of export kava requires 12,300 person days of farm labour or 41 full time jobs.
Papaya	Papaya is Fiji's main export fruit and is seen as having the greatest scope for expansion. The MASRL 2004 Annual Report indicates 1,238 papaya growers producing 2,403 tonnes of papaya in 2003. However, under the Bilateral Quarantine Agreement with New Zealand, there are only around 10 growers registered for export. In 2005, these growers produced 350 tonnes for export.
Eggplant	Eggplant is Fiji'S major fresh vegetable export, with around 400 tonnes exported to New Zealand in 2005. According to MASRL's 2004 Annual Report, 1,285 tonnes of eggplant were grown by 362 farmers, primarily located in the mid-Sigatoka valley. An export orientated eggplant farmer can expect to produce around 11 tonnes of exportable fruit per acre. This will require approximately 310 person day of labour input (McGregor and Gonemaitaba 2003, p. 88). Thus, 1 tonne of export grade eggplant requires about 28 day of farm labour. The export of 400 tonnes of eggplant would require 11,000 person day of labour, or around 40 full time jobs.

No single export crop has come close to approaching the importance of sugar for the Fijian economy. However, horticultural products as a group have come closest to this goal. Fiji's small private exporters have been successful in developing a wide range of niche exports. An inspection of quarantine records show an impressive list of products and markets for a small country. Around 200 different agricultural products are currently being shipped to 20 countries. More significant examples are ginger to the United States, papaya to New Zealand, Japan and Australia, taro to New Zealand and the United States, breadfruit to New Zealand, eggplant to Canada and New Zealand, coconuts to Australia, organic banana puree to France, cut flowers to Canada and kava to Germany. None of these products receive any protection on the domestic or international markets. All these niches taken together represent a significant degree of export diversification. These products represent the future for Fiji's agricultural exports. They have benefited from the WTO Agreement on Agriculture (AoA), to the extent that the freer trade has increased total world income and thus demand for high value products.

Fiji has important inherent advantages in the production of certain high value products that are in demand. Some of the factors upon which these market niches have been based include:

- Isolation has meant relative freedom from major pest and diseases. This enviable quarantine status has given access to some markets from which competitors are excluded or restricted - e.g Fiji papaya to Japan.
- Strategically located in the southern hemisphere. This gives an opportunity to be an off-season supplier for a range of horticultural products. Examples of seasonal opportunities that have been exploited are: fresh ginger to North America, mango to Japan, and eggplant to New Zealand.
- Direct transportation linkages to major Pacific Rim markets. Fiji's produce exporters have direct air links to Sydney, Melbourne, Auckland, Los Angles, Tokyo, and Seoul. New Zealand, Australia, and West Coast North American markets are well served by frequent and competitive shipping services. A subset of these large and affluent urban markets is around 1 million loyal Pacific Islander consumers.
- A commercial industry owned and operated quarantine facility. The operation of Natures Way Cooperative (Fiji) Ltd is the focus of this case study.
- Linkages with tourism. Hawaii provides a model here. The development of Hawaii's large papaya and floriculture export industries was a direct bi-product of the outward freight capacity at reasonable cost created by tourist arrivals into Hawaii. Tourism offers Fiji's

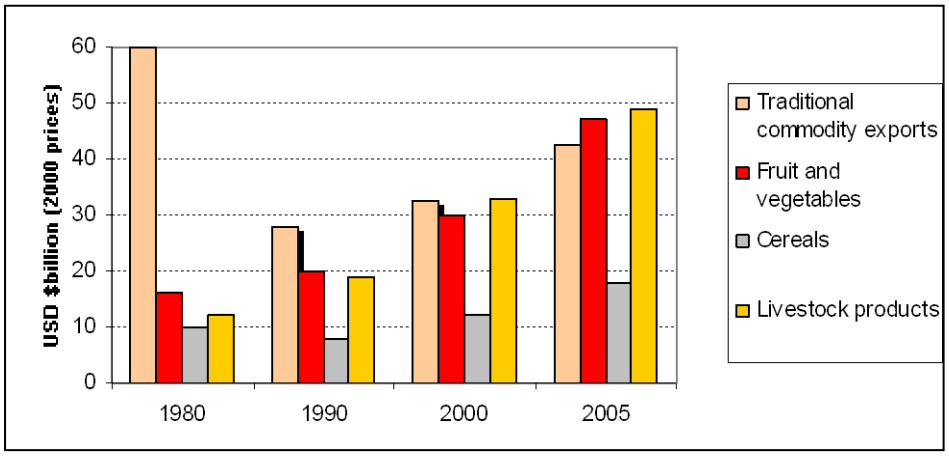
diversified agriculture industry similar opportunities for flowers and value added packaged products such as spices.

- Environmental and health concerns of the market place
  Fiji has a number of distinct advantages in developing significant certified organic[2] industries:
  - General market perception of Fiji as an unpolluted and relatively unspoiled environment.
  - An opportunity to build on, and market, existing traditional and sustainable organic production systems.
  - High demand for products that are technically feasible to produce organically in Fiji (sugar, cocoa, fresh and processed fruits, coconut products and spices).
  - Locally available resources to provide sufficient nutrients to organically produce quality products
  - A non chemical quarantine treatment that allows the export of organic fresh fruit.

The global context of growth in horticultural exports

The relatively strong growth in Fiji's horticultural exports needs to be evaluated in a global context. A revolution has been occurring in the export of horticultural and other high value agricultural products from developing countries. Overall, high value products (including horticulture, livestock, cut flowers, and organic products) now make up some 65% of all developing country agricultural exports, far more than the 21% for traditional tropical products (United Nations Commodity Trade Statistics Database). The real value of traditional commodity exports fell dramatically from 1980 to 1990 (Figure 4). Since then, there has been some recovery but the total export value remains considerably lower than what it was in 1980. In contrast, over the last 25 years the value of horticultural and other high value product exports has grown rapidly, with developing countries gaining a dominant market share for such products. For example, in 2005, developing countries held a 56% share of world trade in fruit and vegetables (excluding bananas and citrus).The value of exports from the fruit and vegetable group in 2005 accounted for 30% of all developing country agricultural exports, compared with only 16% in 1980 and has now surpassed that of traditional commodities (Figu6).

Figure 6: The value of developing country agricultural exports – 1980-2005*



* United Nations Commodity Trade Statistics Database

[2] Products grown in a sustainable manner without artificial chemicals.

For many developing countries, producing horticultural commodities is becoming an important mechanism for growth and poverty reduction with incomes and employment boosted (Ali 2006)[3].

The Pacific islands out of step with global trends

Despite identified market opportunities, the Pacific island countries (PICs) have not been a part of the global horticulture revolution (McGregor 2007). A summary of non-commodity agricultural exports from the PICs is presented in table 6. The total value of PIC non-commodity agricultural exports to all markets in 2005 was around AUD 65 million. To put this in perspective, the region's total exports to Australia in that year stood at around AUD 2,640 million.

This poor export performance is particularly disappointing considering:

- these are agriculturally based economies;
- highly suitable agro-ecological conditions can often be found (e.g. the Highlands of PNG for temperate fruit, vegetables and floriculture products and western Viti Levu for tropical fruit)
- the impressive global growth performance by developing countries in the export of horticultural and other high value agricultural products; and,
- the comparative advantage often identified in the production and export of these products (ADB 1985, ADB 1997, ADB 2004, AusAID 2006).

Fiji starting to prove an exception to the rule for PICs

Fiji is finally starting to prove an exception to the rule amongst the PICs in terms of horticultural exports becoming a lead growth sector. McGregor (2007) identified the main determinates of PIC capability to export horticultural products successfully. These are:

1. suitable agronomic conditions to produce products with identified markets and ready access to an international airport or seaport;
2. the availability of air and sea freight capacity to target markets at reasonably competitive freight rates;
3. private sector marketing capability;
4. quarantine pest status and management, particularly fruits flies; and,
5. ability to resolve phytosanitary and other market access issues.

Fiji, in terms of all 5 factors combined, was shown to be in a far stronger position than the other PICs. The emergence of Natures Way Cooperative (Fiji) Ltd has contributed substantially to Fiji's capability to become a significant horticultural exporter. This paper considers in detail the role of this institutional development in the growth of Fiji's horticultural exports and the diversification of its economy. It also examines the lessons learnt for agricultural lead growth for Fiji and other Pacific island countries.

[3] Ali (2006) notes that the returns to land are about tenfold relative to cereals, and generate considerable employment through production and off farm employment where the jobs in processing, packaging, and marketing are much more than in cereals. Women meet much of this increased demand for labour.

Table 6: A summary of non-commodity agricultural exports from PIC (2005)*

Country	Product	Market	Approx value (AUD ,000)
Fiji	Root crops	Aus/NZ/US	12,500
	Root ginger	NZ/US/Euro	845
	Papaya	Aus/NZ/Jap.	1,230
	Mangoes	NZ	50
	Eggplant	NZ	1,525
	Breadfruit	NZ	55
	Chillies	NZ	75
	Okra	Aust/NZ	33
	Spices	Aus/NZ/US	530
	Noni juice	Aust/US/Euro	213
	Cut flower bulbs	NZ	3
Sub-total			17,059
Tonga	Squash	Japan	9,000
	Vanilla	USA/Aus/Jap/NZ/Euro	3,500
	Coconuts	Aust/NZ	310
	Root crops	Aust/NZ	280
Sub-total			13,090
PNG	Copra meal	Aus/NZ	3,500
	Spices (vanilla)	Aust/NZ/US/Jap/Euro	10,000
Sub-total			13,500
French Polynesia	Noni juice	USA/Aus/Jap/NZ/Euro	12,500
Samoa	Bananas	NZ	2
	Breadfruit	NZ	20
	Coconuts	NZ/Aus	290
	Coconut cream	NZ	910
	Papaya	NZ	5
	Noni juice	NZ/Aus/US	3,230
	Taro	NZ	10
Sub-total			4,467
Vanuatu	Beef	Japan/Aus	1,300
	Root crops	Aust	310
	Coconut meal	Aust/NZ	1,100
	Citrus	NZ	33
	Vanilla	US/Aus/Japan	130
	Essential oils	Aust	450
Sub-total			3,323
New Caledonia	Citrus	NZ	70
	Squash	Japan	1,500
	Preserved meat product	Aust	180
Sub-total			1,750
Cook Islands	Taro	NZ	10
	Papaya	NZ	35
	Cut flower & bulbs	NZ	5
	Noni juice	NZ/Aust/US	420
Sub-total			470
Solomon Islands	Cold press coconut oil	US/Aust	93
	Copra meal	Aust	28
	Noni juice	Aust/Korea	35
Sub-total			156
Nuie	Honey		4
	Taro		32
Sub-total			36
Kiribati	Copra meal		65
Grand Total			**66,416**

*Derived from: Australian Department of Foreign Affairs, Stars Data Base; Pacific Islands Trade and Investment Commission (Auckland); U.S. International Trade Commission's online ITC Trade Dataweb (http://hotdocs.usitc.gov/docs/tata/hts/bychapter/0612HTSA.pdf); Pacific Islands Trade Centre (Tokyo) (www.pic.og.jp/en/stats/htm) ; Japan Tariff Association data supplied by Asian Markets Research, export trade statistic of individual PICs.

5 Nature Way Cooperative (Fiji) Limited

Natures Way Cooperative (Fiji) Ltd (NWC) is a registered cooperative owned and operated by the Fiji fresh produce export industry. NWC's core business is the quarantine treatment of fruit fly host products.

5.1 What is High Temperature Forced Air (HTFA) Quarantine Treatment?

The quarantine treatment technology used by NWC is known as high temperature forced air (HTFA). HTFA was developed in Hawaii as a quarantine treatment for papaya to replace the highly unsatisfactory double dip hot water treatment[4]. The HTFA process involves slowly heating the fruit (5-6 hours) to a temperature that can kill fruit fly larvae and eggs (around 47.2 ^{0}C). These units also have the added bonus of increasing the shelf life of fruit and thereby enhancing marketability. An international patent on the HTFA technology is currently held by a New Zealand based company Quarantine Technologies International (QTI).[5]

Commercial HTFA units have the capacity to handle from 250 to 2,000 kg of fruit per treatment run. Thus the larger unit has the capacity to treat up to 2,000 tonnes of fruit in a year. The capital cost of a full-scale unit ranges from around USD100, 000 - 200, 000, plus the cost of a packing shed and other ancillary equipment. The total

[4] Double dip hot water treatment was an interim measure when the use of the chemical fumigant ethyl dibromide (EDB) was banned by importing countries in 1985.

[5] Quarantine Technologies International 463 Frankton Road, PO Box 1030, Queenstown, New Zealand Tel 64 3 441-8173; Fax 64 3 441 8174; qtiiwill@hotmail.com Contact: Michael Williamson (Managing Director)

capital cost of a larger complete facility would be around USD 1 million.

In the late 1980s, The Cook Islands pioneered the adoption of HTFA technology amongst Pacific island Countries (PICs) with the export of papaya to New Zealand. Technical and financial assistance was provided by New Zealand. Fiji and Tonga established commercial HTFA units in the mid-1990s, with technical assistance provided by the United States Agency for International Development (USAID). These were followed by commercial units in Vanuatu and New Caledonia. Only the Fiji unit has sufficient throughput to be commercially viable.

5.2 Who is Natures Way Cooperative (NWC)?

Natures Way Cooperative (NWC) was established in1995 to own and operate the new quarantine treatment facility on behalf of Fiji's fruit growers and exporters. The requirement of USAID, who provided the technology and the equipment, was that the quarantine treatment facility be operated by the private sector (the industry).

Prior to the establishment of NWC, quarantine treatment throughout the Pacific islands was undertaken by government quarantine departments. These were chemical treatments such as ethyl dibromide (EDB) and methyl bromide and were usually provided free of charge or at highly subsidised rates. The concept that quarantine treatment would be undertaken by the industry itself was a major departure from this institutionalised norm.

There were two alternative business models available for the new industry owned and managed quarantine treatment business:

- A registered Cooperative governed by the Cooperative Act, or;
- A limited liability company governed by the Companies Act.

Under both options, those who used the service (the exporters and farmers) would be the shareholders. The cooperative option was selected and Natures Way Cooperative (Fiji) Ltd was registered in August 1995. Operating as a registered cooperative has served the business reasonably well in its 12 years of operation. However, there have been a number of short comings and problems arising from being a cooperative. These are discussed in this paper.

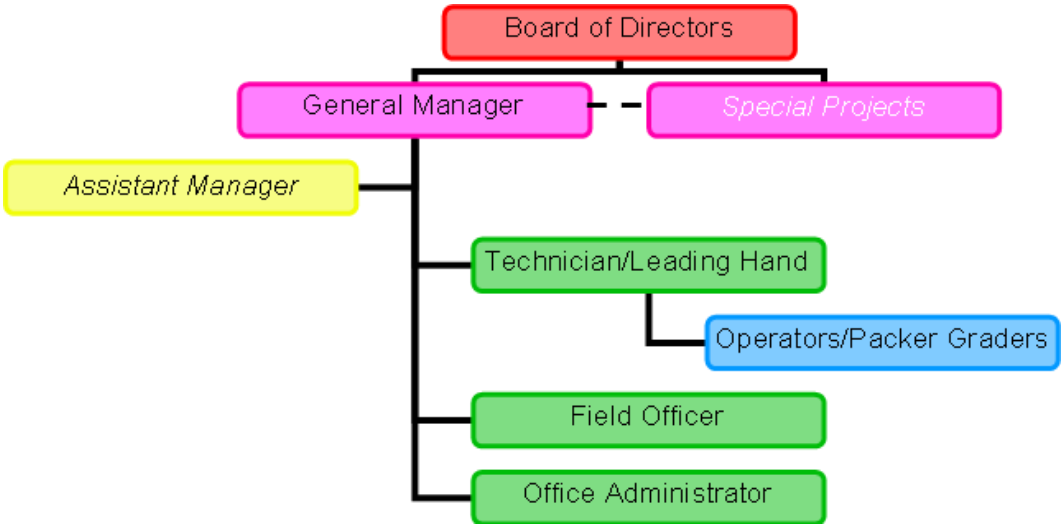
The USAID under its Commercial Agriculture Development (CAD) Project for the South Pacific provided the treatment chamber and ancillary equipment for a total cost of FJD249, 000. USAID also met the cost of the Manager for 1-year and technical assistance to establish the facility. The Civil Aviation Authority of Fiji (CAAF) provided the site for the treatment facility and the Ministry of Agriculture provided the funds for the building (around FJD250, 000).

NWC is a service cooperative that treats and packs fruit on behalf of its members. It is not involved in exporting, which is handled by individual exporters. The exporters must be NWC shareholders to utilise the HTFA facilities and they should purchase their produce for treatment from farmers who are also shareholders[6]. This later requirement is not enforced. Exporters pay a fee per kg of fruit treated. This rate was originally set at FJD0.40/kg plus VAT. This same rate was retained until the end of 2008, when the rate was reduced to FJD 0.35/kg, for exporters whose accounts were current. NWC now has around 152 shareholding members, most of which are small farmers located in the Sigatoka Valley and in the Nadi area.

The current management structure of NWC is shown schematically in figure 6.

[6] The cost of shares is FJD100 for exporters and FJD 50 for farmers.

Figure 7: NWC Management Structure



5.2.1 The business off to a rocky start

NWC, as an industry owned and operated business, had an inauspicious start to commercial operations. At the very time of the first export treatment, a group of exporters were petitioning the Permanent Secretary for the Ministry of Agriculture to take over operations of the facilities. They argued that a commercial treatment fee of FJD 0.40/kg "would make them uncompetitive on export markets". Some no doubt were comfortable with the previous arrangements with the Ministry of Agriculture Quarantine operated EDB chamber, which was open to considerable abuse in terms of the amount of fumigant that was applied. There were also senior officers within MAFF agitating for the retention of quarantine treatment services, arguing that "Government should get the facility up and running and then pass it on to the private sector". To his credit the then Permanent Secretary, Mr Peniasi Kunatuba, rejected the petition and honoured the agreement with USAID that the HTFA facility would be run by the private sector.

The first commercial treatment of papaya did not occur until October 28th 1996. The delay of almost a year between certification and export was primarily the result of the CAD Project ceasing operations soon after the certification of the facility. CAD closed a year earlier than scheduled, leaving the newly created quarantine treatment business in a very precarious financial position[7]. Project funds that had been allocated for staff training, business development support and most importantly working capital, were not forthcoming. A loan request for $60,000 in start-up capital made to all the commercial banks was not successful. Similar loan requests made to the Fiji Development Bank (FDB) was rejected[8]. A request was also made to International Finance Corporation's South Pacific Project Facility (SPPF) to provide technical assistance in the sourcing of funding. SPPF was not willing to provide assistance to NWC because it was a cooperative. The argument that it was a management structure rather than business structure that mattered fell on deaf ears.

[7] The termination of the CAD project a year earlier due to the performance of the project, but was a consequence of the Clinton Administration decision to close USAID operations in the South Pacific.

[8] The decision by the Development Bank was particularly disappointing given the projected financial viability of the venture and the clear development benefits it would bring to the country.

NWC faced the prospect of being aborted before it even started operations and passing quarantine treatment operations back to the government. Fortunately, NWC was able to secure the necessary start-up funding from a variety of other sources[9]. This was largely through the initiative and determination of NWC's manager and the assistance of the CAD Project Leader who remained in Fiji after the closure of the Project. The turning point for NWC came with the visit to the facility of New Zealand Minister of Foreign Affairs, Hon. Don McKinnon. The Minister recognized the critical importance of the success of this venture for produce exports from the Pacific islands and immediately authorized the release of $40,000 as start-up capital for NWC.

A desirable consequence of NWC's start-up capital requests being rejected by the commercial banks and the FDB is that it began commercial operations debt fee. The business has been able maintain this status over its 11 years of operations and is expected to maintain into the future.

5.3 Performance evaluation

5.3.1 Export performance

Over the last decade NWC has grown from a small business handling just 30 tonnes of papaya to an agribusiness treating 1,200 tonnes fruit (papaya, mango, eggplant and breadfruit) annually for export (Figure 7 and table 6). Over the period 1996 to 2008 inclusive, 7,163 tonnes of fruit were treated and exported (table 6). Of this total, 6,258 tonnes were exported to New Zealand (87%) and the balance of 912 tonnes to Australia. In 2008, 686 tonnes were exported to New Zealand (79%) and 178 tonnes to Australia (21%). Of the total fruit treated, 3,526 tonnes has been papaya (49%), 3081 tonnes eggplant (43%), 493 tonnes mango (7%), and 65 tonnes bread fruit (1%) (figure8).

Papaya

HTFA treatment was first developed in Hawaii for papaya. When NWC was formed, papaya was the only commodity for which the HTFA quarantine treatment technology utilized. Thus the initial feasibility study for treatment facility was based entirely on papaya. It was projected that within a few years of operation, around 500 tonnes of papaya would be treated annually.

Fiji was identified to be well placed as a substantial papaya exporter, based on the following considerations:

- Favourable soils and climate[10]

[9] The various funding sources were:

Funding source	Amount ($F)	How utilized
Fiji/New Zealand Business Council	10,000	Training
Fiji/New Zealand Business Council	6,733	Training
SPC Fruit Fly Project	4,201	Purchase of fruit for protocol development
ESCAP/Pacific Operations Center	9,000	Training and protocol development
Gov. Fiji (Commissioner Western discretionary fund)	10,000	Working capital grant
NZ ODA	40,000	Working capital grant
Friends of Nature's Way Contributions	1,000	Working capital
Total	**$80,974**	

[10] The river valleys of Western Viti Levu offer excellent growing conditions for Hawaiian solo "sunrise" variety papaya. A true type "Sunrise" papaya consistently produces fruit that combines exceptional

- Favourable pest and disease status.[11]

Figure 8. Fruit treated for export by NWC – 1996 to 2008

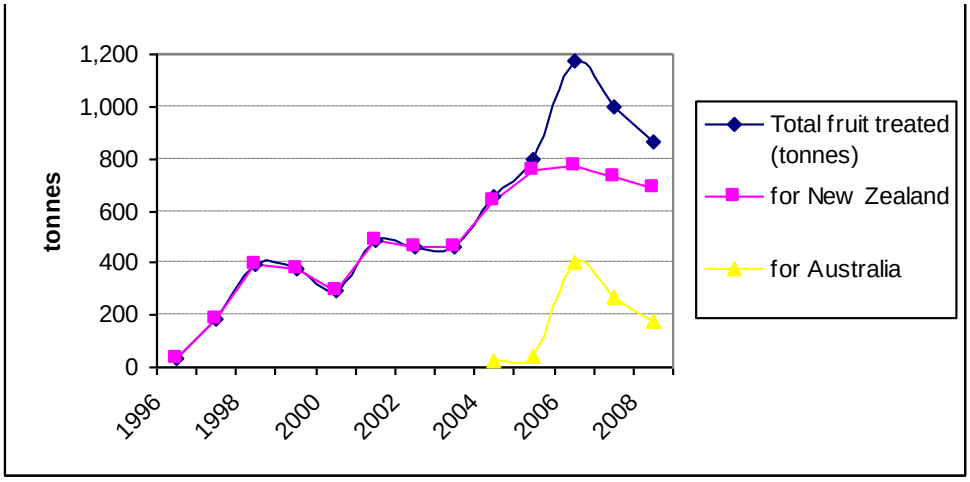
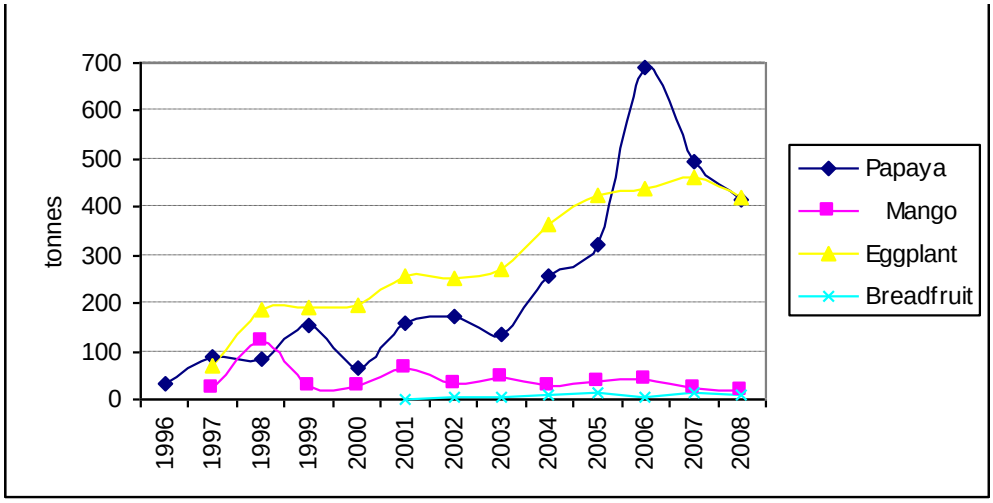


Figure 9. Natures Way Treatments by Commodity – 1996 to 2008



- A functioning commercial quarantine treatment.

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sweetness and flavour (high o brix-10%-12%), strong red coloured flesh, with good size characteristics (400 to 600 gm) and good keeping qualities. The meeting of this potential, however, requires the use of good quality planting material, and the application of the correct package of practices, with a particular emphasis on irrigation and plant nutrition.

[11] The most notable papaya disease that is absent from is papaya ring spot virus (PRV). PRV decimated the Hawaii papaya industry11. Some industry recovery has only been possible through the introduction of genetically modified (GM) papaya that is resistant to PRV. The PRV resistant varieties are considered inferior to the solo "sunrise" papaya and do not have access to remunerative markets. Papaya is regarded as a host to the Pacific Fruit Fly (Bactrocera passiflorae). Hence the need to use quarantine treatment for papaya exported from Fiji to Australia and New Zealand. However, there are no records of B. passiflorae infesting fruit at the colour break to half ripe stage that papaya is exported from Fiji at. As a consequence fruit flies are not a production pest for papaya in Fiji. This contrasts to the situation for papaya in Hawaii and Australia where fruit flies cause major damages to papaya unless costly on-farm control measures are taken. PRV became established in Hawaii in 1992. As result of this disease out-shipments of papaya decreased from 18,500 tonnes in 1990 to 9,600 tonnes 2002 (Hawaii AgriculturaStatistics).

- Strong export and local market demand.

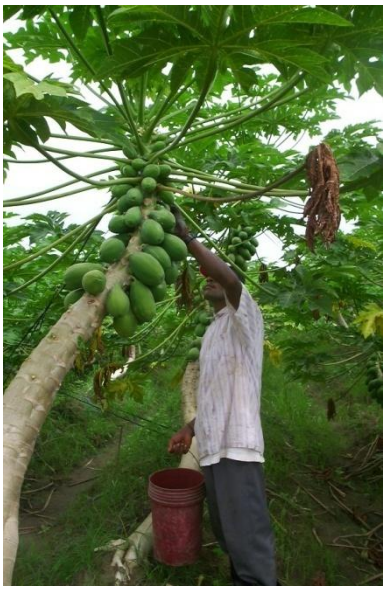
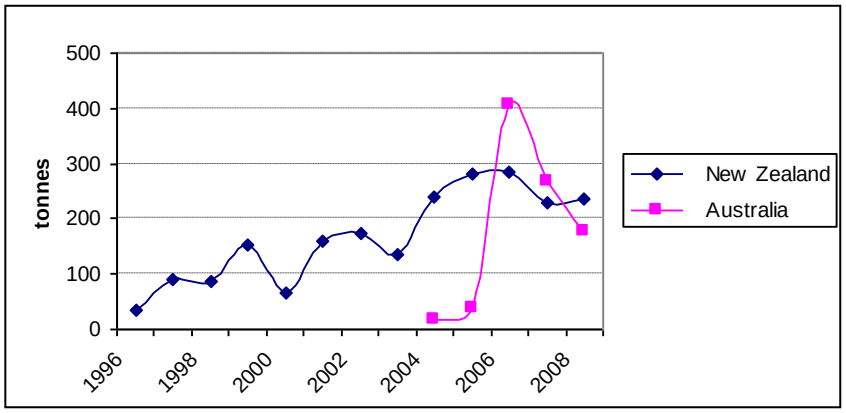


Figure 10.Papaya exports (1996-2008)



New Zealand. A study of the New Zealand market undertaken by the CAD Project in 1995 concluded "that papaya sales in New Zealand of 1,000 tonnes at remunerative prices would seem to be readily achievable provided there was continuity of supply and good quality fruit". As is so often the case with Fiji agriculture, this continuity of supply was not forthcoming. The market uptake of the smaller red-fleshed sunrise variety was also slower than expected, with consumers having an established preference for the larger "Waimanalo" variety from the Cook Islands. In recent years the Philippines has become the dominant player in New Zealand papaya market, accounting for 70% market share in 2008.

The original CAD market study was updated in March 2009(McGregor and Stice 2009). This updated market study projected size of the New Zealand market for Fijian papaya to be around 400 tonnes if the current marketing status quo remains the same. This is well short of the 1,000 tonnes estimated in 1995, when the feasibility study was undertaken for the HTFA facility. However, the study concluded Fiji papaya still retains an inherent competitive advantage in the New Zealand market. Thus a share 50 to 70% over the next 5 years is seen as a reasonable expectation if the price competitiveness, quality and marketing improvements are made. This market share would equate to around 2,000 tonnes per annum. The improvements are in four broad areas.

- Price competitiveness (improvements in the terms of trade, reducing the price paid to growers, reducing the cost of quarantine treatment, reducing the cost of transportation)
- Reliability of supply (spreading out the geographic distribution of papaya plantings and spreading planting throughout the year);
- Quality (control of post harvest diseases on farm, harvest and post harvest handling, grading, and packaging);
- Marketing (branding of Fiji Red, in-store promotion and consumer awareness, food safety and quality certification)

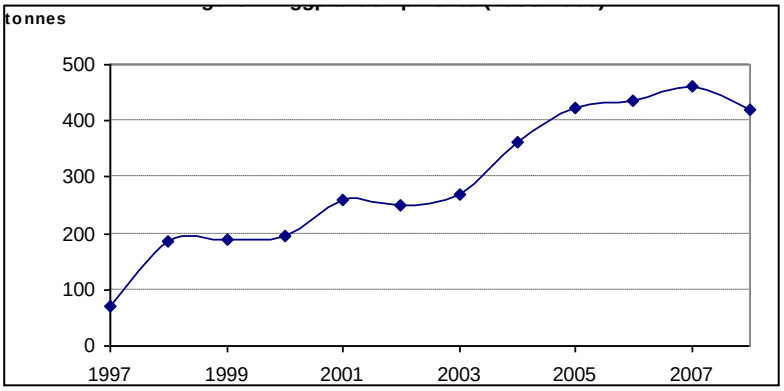
Australia: It had been assumed that exports to the Australia market would recommence soon after New Zealand. During the 1980s, Fiji was a significant exporter of papaya to Australia. It was not until December 2003 that approval was finally given by AQIS for the importation of HTFA treated papaya from Fiji. The non-availability of access to the Australian market was a major constraint to significant investment in the Fiji papaya industry. Had the quarantine treatment business relied solely on papaya treatment, it would not have survived financially. It is only in the last few years that papaya has been able to establish itself as the dominate commodity treated.

The first shipment of papaya to Australia was made on October 2004, with 19 tonnes shipped in that year. In 2005, only 38 tonnes were shipped to Australia. The lagged production response to the opening up of the Australian market is hardly surprising given that it took 7 years to negotiate market access. It was not until March 2006 that significant papaya exports to Australia began. In that month Cyclone Larry devastated the main Australian papaya growing areas of Innisfail and Mareeba in far North Queensland. In that year407 tonnes of papaya were exported to Australia. The Australian papaya industry has yet to fully recover from the impact of Cyclone Larry, which has faced additional constraints of drought and the availability of irrigation water. Thus Fiji has been able to maintain significant exports to Australia in 2007 and 2008 (figure 8). These exports would have been significantly higher if the supply of good quality fruit was available. The March 2009 market study projected the size of the Australian market for Fijian papaya to be around 500 tonnes if the current marketing status quo remains the same (McGregor and Stice 2009). The study concluded that an Australian market share of 10 to 20% over the next 5 years is seen as a reasonable expectation if the price competitiveness, quality and marketing improvements can be put into place. This would translate to a papaya market of 1,500 to 3,000 tonnes.

Eggplant

HTFA treated eggplant was certified for export to New Zealand in July 1997 and the first commercial shipment was made on August 1997. This was a world's first for HTFA quarantine treatment for eggplant and represented a major achievement for NWC. HTFA treated eggplant proved to be a real success story, with exports to New Zealand increasing rapidly due to the superior keeping quality of HTFA treated fruit compared with EDB fumigated fruit. Eggplant is now exported year round to New Zealand and not just during the winter window as was previously the case. Eggplant exports to New Zealand in recent years have oscillated around 430 tonnes annually (figure 11). The unexpected success of HTFA eggplant has provided the basis for Nature's Way achieving financial viability during its early years of operation.

Figure 11: Eggplant shipments (1996-2008)



Eggplant exports have been entirely to New Zealand and only modest growth in this market can now be expected. The expected entry of Fiji eggplant into the Australian market has not materialized as was assumed in the Strategic Plan (2002-2006). This represents a failure on the part of FQIS in securing market access. At the time papaya was approved, the AQIS Officer responsible for Fiji requested the next commodities to be submitted for market access processing. NWC recommended to FQIS eggplant and breadfruit as the industry priorities for submission to AQIS. To this day, FQIS has not submitted the necessary confirmatory and pest risk data on eggplant or breadfruit to AQIS. The work requirements for FQIS to make these submissions are minimal since the same data has already been submitted to New Zealand.

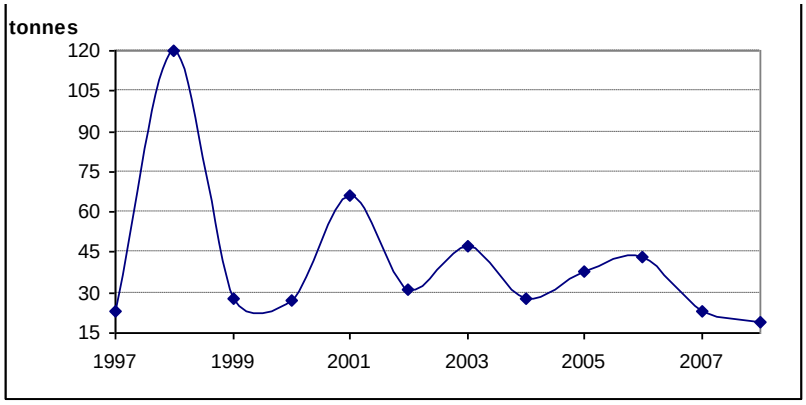
Table 7: Fruit treated and income generated by Natures Way Cooperative – 1996 to 2008

	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	Total
Papaya														
treatments (kgs)														
New Zealand	33,037	90,010	85,965	152,000	66,906	161,403	173,373	137,192	238,234	282,672	285,908	230,150	236,076	2,172,926
Australia									18,775	38,110	406,779	266,820	178,212	908,696
sub-total	33,037	90,010	85,965	152,000	66,906	161,403	173,373	137,192	257,009	320,782	692,687	496,970	414,288	3,081,622
income ($,000)														
income due to NWC	13,215	36,004	34,386	60,800	26,762	64,561	69,349	54,877	102,804	128,313	277,075	198,788	165,715	1,232,649
reported fob value of exports (NZ)	69,378	250,228	232,106	355,680	153,884	316,380	572,131	452,734	786,172	932,818	943,496	759,495	779,051	5,225,897
reported fob value of export (Aus)									75,100	152,440	1,627,116	1,067,280	712,848	3,634,784
sub-total	69,378	250,228	232,106	355,680	153,884	316,380	572,131	452,734	861,272	1,085,258	2,570,612	1,826,775	1,491,899	8,860,681
farm gate value of exports	23,126	63,007	64,474	114,000	53,525	129,122	138,698	123,473	231,308	288,704	692,687	496,970	414,288	2,833,382
Mango														
treatments (kgs)														
New Zealand		23,072	120,209	28,000	26,672	66,419	31,129	46,602	28,190	38,023	42,608	23,170	19,447	493,541
income ($,000)														
income due to NWC		9,229	48,084	11,200	10,669	26,568	12,452	18,641	11,276	15,209	17,043	9,268	7,779	197,416
reported fob value of exports		32,993	306,533	43,960	23,738	179,331	93,387	139,806	84,570	114,069	127,824	69,510	58,341	1,480,623
farm gate value of exports		11,536	60,105	14,000	13,336	33,210	15,565	23,301	14,095	19,012	21,304	11,585	9,724	246,771
Egg plant														
treatments (kgs)														
New Zealand		69,615	185,155	190,000	196,737	258,554	249,871	270,672	361,510	423,705	436,509	461,845	418,721	3,522,894
income ($,000)														
income due to NWC		27,846	74,062	76,000	78,695	103,422	99,948	108,269	144,604	169,482	174,604	184,738	167,488	1,409,158
reported fob value of exports		77,969	281,436	212,800	574,472	488,667	624,678	676,680	903,775	1,059,263	1,091,273	1,154,613	1,046,803	8,192,427
farm gate value of exports		48,731	129,609	133,000	137,716	193,916	187,403	203,004	289,208	338,964	349,207	369,476	334,977	2,715,210
Breadfruit														
treatments (kgs)														
New Zealand						2,063	5,454	6,823	9,936	12,109	4,678	12,804	11,442	65,309
income ($,000)														
income due to NWC						825	2,182	2,729	3,974	4,844	1,871	5,122	4,577	26,124
reported fob value of exports						6,189	16,362	20,469	29,808	36,327	14,034	38,412	34,326	195,927
farm gate value of exports						1,032	2,727	3,412	4,968	6,055	2,339	6,402	5,721	32,655
Total														
treatments (kgs)	**33,037**	**182,697**	**391,329**	**370,000**	**290,315**	**488,439**	**459,827**	**461,289**	**656,645**	**794,619**	**1,176,482**	**994,789**	**863,898**	**7,163,366**
Income ($,000)														
income due to NWC	**13,215**	**63,850**	**108,448**	**136,800**	**105,457**	**168,808**	**171,479**	**165,875**	**251,382**	**302,638**	**453,550**	**388,648**	**337,780**	**2,667,930**
reported fob value of exports	**69,378**	**361,190**	**820,075**	**612,440**	**752,094**	**990,567**	**1,306,557**	**1,289,689**	**1,804,325**	**2,142,476**	**2,176,627**	**2,022,030**	**1,918,520**	**15,094,873**
farm gate value of exports	**23,126**	**123,274**	**254,187**	**261,000**	**204,577**	**357,279**	**344,393**	**353,189**	**539,579**	**652,734**	**1,065,537**	**884,433**	**764,709**	**5,828,017**

Mango

In 1997, mango was the third commodity to come on line for HTFA treatment to New Zealand. HTFA treatment had been successfully tested elsewhere for mango, but it had not hitherto been commercially utilized - hot water being the preferred treatment for mango. Annual throughput of mango has been highly variable – ranging from 19 tonnes in 2008 to 120 tonnes in 1998 (figure 12). The average annual throughput has been 41 tonnes. The variability in throughput is largely due to the effect of weather, particularly for the improved variety mango. Exports are almost entirely based on traditional Fiji varieties to New Zealand. Fiji's improved variety mangoes cannot normally compete with Ecuadorian mangoes. It is unrealistic to expect market access for Fiji mango into Australia or the United States, due to presence of mango seed weevil.

Figure 12: Shipment of mango (1997 to 2008)



Breadfruit

Fresh breadfruit exports to New Zealand have shown steady growth since the first shipment of HFTA-treated breadfruit in October 2001. Exports were 2 tonnes in 2001, with exports over the last few years being around 12 tonnes. Performance has been well below market potential identified in the Strategic Plan (2002-2006), which projected exports of 150 tonnes. This projection was based on a combination of positive indicators: 1) breadfruit's proven suitability to HTFA treatment; 2) the existing production base; 3) a large New Zealand market already in place; and 4) the potential markets of Australia and the United States. To assist growers and exporters in achieving breadfruit's market potential Natures Way Cooperative produced "A Manual for the Growing and Marketing of Breadfruit for Export" and a supporting poster (Natures Way Cooperative 2005). The manual focused on the need to move from wild harvesting of fruit to growing breadfruit as a crop and introducing appropriate quality control and post harvest handling procedures. Again FQIS has failed to make breadfruit market access submissions to Australia and the United States. NWC has been able to secure assistance to prepare a breadfruit market access submission for the United States. This submission is now with USDA APHIS.

Other commodities

The approval of mixed treatments by New Zealand MAF in 2001 created prospects for a number of minor fruit fly host products for HTFA treatment. The Strategic Plan identified gourds (bitter, bottle, and sponge), wi, jak fruit and limes as priority products having good market opportunities and likely to be well suited to HTFA treatment. All these products were included in Strategic Plan projections. It was suggested that a number of other fruit fly host commodities could come on stream over the next 5 years, but for which no projections were made. These included passion fruit, rockmelon, guava (Thai variety) and tomatoes. However, none of these "new" products have come on line. Regrettably the last market access approval obtained was for bread fruit to New Zealand in 2001.

5.3.2 Economic performance

Since NWC commenced operations in 1996, approximately $15 million has been generated in foreign exchange earnings of which nearly $6 million has been paid to farmers (table 7). Currently NWC annually generates around $2million in export earnings and $800,000 in farmer income. Because of the capital investment made by NWC a threefold increase in export earnings and farmer income is now feasible.

Table 8 shows the number of farmers who supplied produce that was treated by NWC in 2008. This represents an estimated 330 full time job equivalents. To this has to be added the employment provided by the exporters (176) and by NWC (18). The total direct employment generated by NWC is estimated to be around 530 full time job equivalents. The projected increase in employment resulting from the capital investment made by NWC are shown table 8[12].

Table 8: The estimated and projected employment created by HTFA treated fruit exports

	2008	2009	2010	2011	2012
Fruit treatments (tonnes)	864	1655	2150	2580	3210
Estimated emplpyment (full time job equiv.)					
On-farm	333	414	538	645	803
Exporter	176	219	284	341	424
Natures Way	18	28	28	30	30
Total	527	661	850	1,016	1,257

5.3.3 Financial performance

To become a shareholder in NWC farmers pay FJD 50 and exporters FJD 200. This was set at low rate to encourage membership of the Cooperative. However, in hindsight this rate was set far too low. A higher share value (say FJD 100 and FJD 1,000 respectively) would have provided a significant injection of much need working capital in the early years of operation and would have provided for a far better capitalisation position. Overtime the business has been able to offset the relatively low level of shareholder contributions with a high level of retained earnings.

The financial performance of NWC since its inception in 1996 is summarized in table 9. A significant proportion of the costs of operating a quarantine treatment facility are fixed. Fixed costs include: management overheads, depreciation of fixed assets, repairs, maintenance, chamber certification and professional fees. Thus, the unit cost of quarantine treatment is particularly sensitive to throughput. As a consequence the treatment gross margin (the difference between the treatment charge and the unit cost of treatment) increases with increasing throughput. From its inception in 1996 until May 2008 a treatment charge of 40c/kg (plus VAT) of fruit treated has applied. The rate is now 35c/kg for exporters whose accounts are current. In the early years of low throughput this was not sufficient to cover costs and negative gross margins were incurred. However, as throughput increased the unit treatment charges fell sharply and healthy positive gross margins began to be achieved.

[12] These projections were made a part of NWC's Enterprise Challenge Fund grant proposal.

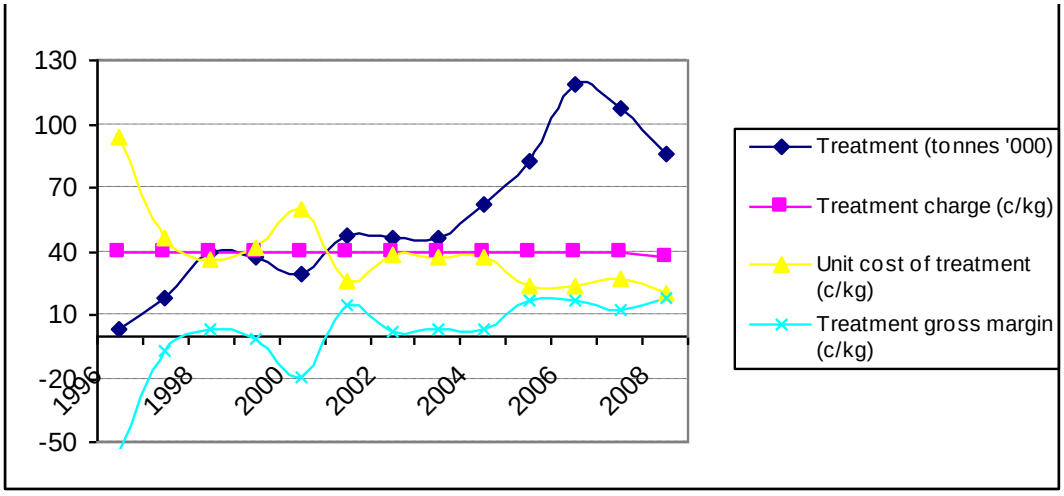
Table 9: A summary of NWC Financial Performance (1996 – 2008)

Financial Year	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Treatment (kgs)	33,037	182,697	391,329	370,000	290,315	475,000	459,000	461,000	620,000	825,000	1,197,000	1,070,000	864,000
Treatment charge (c/kg)	40	40	40	40	40	40	40	40	40	40	40	40	37
Revenue payable ($)	13,215	73,079	156,532	148,000	116,126	190,000	183,600	184,400	248,000	330,000	478,800	428,000	319,680
Revenue paid ($)				167,650	139,544	136,387	206,134	177,847	222,780	296,129	390,472	451,574	230,734
Total expenditure ($)	31,108	85,265	142,874	153,041	173,421	120,207	175,199	172,155	230,783	190,750	283,851	291,277	169,603
Unit cost of treatment (c/kg)	94.16	46.67	36.51	41.36	59.74	25.31	38.17	37.34	37.22	23.12	23.71	27.22	19.63
Treatment gross margin (c/kg	-54.2	-6.7	3.5	-1.4	-19.7	14.7	1.8	2.7	2.8	16.9	16.3	12.8	17.4
Net operating profit before tax ($)				14,615	(33,877)	16,180	32,107	5,692	29,039	79,461	80,280	127,503	79,601
Retained earnings ($)				14,615	(33,877)	16,180	28,547	5,692	22,951	47,354	55,393	18,175	45,616
Trade debtors at end of FY										71,378	87,802	125,506	150,641

* Derived from NWC Audited Accounts - for Financial Year ending June 30th, except for 2008, which is taken as the period ending December 30th 2007.

The last few years, with increased throughput and improved labour efficiency, have seen NWC achieve a reasonably sound financial position. Figure 13 plots treatment volume, treatment unit cost and treatment gross margin over the period 1996 through 2008. For the four years ending 2008, before tax profits of $79,461, $80, 280, $127,503 and $79,601 were recorded, with retained earnings of $71, 378, $87, 807, $18,175 and $45,616 respectively.

Figure 13: The relationship between treatment throughput and financial viability



5.3.4 Investment in quarantine treatment capacity

It is in the area of capital investment that NWC has performed exceptionally well. Over the last decade retained earnings have been invested in a program to increase treatment capacity and to enhance product quality. The total value of this investment has been around FJD300, 000 and has included: shelter for containers awaiting collection; an administration office complex; back-up generators; treatment lugs; 4WD vehicle; and, a part of the cost of a wide-body treatment chamber.

However, there have not been sufficient retained earnings to meet the larger scale capital investment to expand treatment capacity to 3,000 tonnes of produce annually. A treatment capacity of 3,000 tonnes was estimated to be the treatment capacity required to satisfy identified market requirements in the medium term (Natures Way Cooperative 2009).Fortunately, NWC has had been able to lever donor and other assistance to meet these additional investment requirements. NWC has been successful in securing external capital funding because it has demonstrated its willingness to make a substantial contribution of its own retained earnings to expand the business.

5.3.5 Levering donor and technical assistance

NWC management has been particularly skilful in securing external capital funding and technical assistance to support the development of the Fiji fruit and vegetable export industry. A list of the assistance received since 1994 is presented in table 10. The total value of this assistance has been some FJD2 million.

Table 10: Donor and technical assistance support to NWC

Year	Funding source	Amount (FJD)
1994-95		
treatment chamber and ancillary equipment	USAID	400,000
manager salary for 1st year	USAID	35,000
construction of building	Fiji Gov	250,000
		685,000
1996		
Training of operators	Fiji/NZ Business Council	16,733
Protocol development and certification	SPC	4,201
Protocol development and certification	ESCAP/Pacific Operations Center	9,000
Working capital	Commissioner Western Discretionary Fund	10,000
Working capital	NZ ODA	40,000
Working capital	Friends of Nature's Way Contributions	1,000
		80,934
1997-2008		
Preparation of the 2002 - 2006 Strategic Plan	EU EBAS Scheme	80,000
Part funding of acquistion of a wide-body chamber from Hawaii	Bristish American Tobacco Co	43,000
A Manual for the Growing and Marketing of Breadfruit for Export	International Finance Corporation/ World Bank	85,000
Two bay extension for the building	Min Commerce Fiji Gov	380,000
Support for the establishment of a NWC Field Service	AusAID	100,000
Matching grant for new treatment chamber and ancillary equipment	AusAID/Enterprise Challenge Fund	303,000
		991,000
2009 - 2010		
Fiji papaya project	ACIAR	202,514
Papaya Value Chain	FAO	46,000
		248,514
Total assistance received		**$ 2,005,448**

5.3.6 Ability to raise commercial finance

NWC has proven itself to be a financially viable operation. However, it would not have been possible to get established and to expand without donor assistance. Borrowing from commercial banks is not a realistic option.

An HTFA treatment chamber and grading and packing systems are highly specialised pieces of equipment, with virtually zero salvage value. There is no market for the resale of this equipment in Fiji and elsewhere. Thus, these items have little value as security to commercial banks. The land on which the HTFA facility is located is owned by Airport Fiji Ltd. Thus land cannot be offered as collateral. Commercial banks operating in Fiji have shown to be universally reluctant to loan to agricultural projects based on cash flow projections alone. Export horticulture is perceived as being particularly risky. NWC's own experience illustrates the difficulty in securing commercial loan funding. There was a delay of almost a year between certification and the first exports. This was the result of difficulty in securing working capital to finance the operation. A loan request for FJ D60, 000 in start-up funding from three commercial banks was not successful. Similar loan requests made to the Fiji Development Bank (FDB) were also rejected. The quite low level of shareholder contributions ($50 for farmers and $200 for exporters) undermined the credibility of these loan requests. NWC faced the prospect of being aborted before it even started operations, passing quarantine treatment operations back to the government. Fortunately, the necessary start-up funding came from a variety of other sources. The turning point for NWC came with the visit to the facility of New Zealand Minister of Foreign Affairs, Hon. Don McKinnon. The Minister recognized the critical importance of the success of this venture for produce exports from the Pacific islands and immediately authorized the release of FJD 40,000 as start-up

working capital for NWC. The rest is history – although the difficulty in securing commercial bank funding for this type of agriculture project has remained unchanged.

The willingness of NWC to make a substantial contribution of its own retained earnings to expand the business has been an important factor in securing donor assistance. The projects for assistance have had substantial demonstrable development outcome (such as expanding exports and increasing employment). NWC management have established an outstanding record of project implementation, reporting and financial accountability.

5.3.7 Management performance

Warner et.al (2008) reviewed Natures Way Cooperative as part of their global study of market-oriented agricultural infrastructure: an appraisal of public private sector partnerships. They concluded that the key success factors were (p, 106):

- Quality and continuity of management. The same chairman and general manager have served from the outset.
- No government interference in the operations of the business.
- Role of government confined to the initial provision of capital and the carrying out of core quarantine regulatory functions.
- Shareholders have not interfered in the day-to-day operations of management.
- Quarantine treatment fees have been set at an economic rate from the outset. This has enabled the business to run profitably and retain a sufficient level of earning to fund repairs and maintenance, to invest in the expansion of the business and to make "rainy day" provisions for events, such as cyclones and trade bans.
- The business was able to quickly move to a level of plant utilization that yielded a positive cash flow.

Sant Kumar, who has been the Manager from the outset, has proven be an outstanding leader for this pioneering business. It was through his perseverance that the initial working capital was raised to commence operations. He has guided the development of the staff to the point that the day-to-day operations are now fully institutionalized. Successfully dealing with Fiji's exporters is a demanding task requiring a special talent. Sant Kumar has dealt with the exporters firmly and with integrity and has earned their respect. It cannot be overstated how important this has been in the success of this business that operates in a sometimes questionable ethical environment.

The incumbent retires as the NWC General Manager at the end of 2009. In July 2009 Michael Brown, who has a strong management background and well over 30 years of agro-industry experience, has commenced work as Sant Kumar's understudy and will become the manager at the beginning of 2010.

In retrospect the major management weakness has been in the control of exporter arrears. As exports expanded rapidly these arrears escalated to unacceptable levels for a few of the larger exporters. In an environment of expanding exports it has proven difficult to reign in these debts. It is hoped that the recently introduced combination of "carrot and stick" measures will bring the arrears situation under control. However, this will now be made more difficult as a result of the catastrophic floods of January 2009.

NWC's Management has been fortunate to have had a supportive Board of Directors and Chairman. Tim Casey has served as NWC Chairman since the inception of the business. As the Manager of one Fiji's most success agribusinesses he has been able to provide invaluable leadership and guidance to the Cooperative. He has provided this as a disinterested party – not being an exporter himself. Through the Chairman, a valuable relationship between Natures Way and Southern Development Company (SDC) has been established. During the first few years of operations SDC has provided high quality accounting and administrative support. No Directors fees have been paid to the Board members, which has helped reduce the overhead costs of the business.

Initially a large portion of the manager's time is taken up with administrative and clerical duties. This meant that best use was not made of the manager's special talent and

experience in working with farmers and exporters. The Business could benefit greatly from the manager spending much more time in the field dealing with production, quality and quarantine issues. To improve this situation the Strategic Plan (2002-2006) recommended that an office manager be appointed and establishing a NWC field service established. Both recommendations were adopted.

5.3.8 Providing for a "rainy day"

As shown in figure 13, the unit cost of quarantine treatment is in large measure determined by treatment throughput (see 5.3). The nature of the business is that from time to time there will be sharp declines in throughput due to factors that are outside the control of NWC. Examples are natural disasters, political disturbances and the discovery of an exotic new fruit fly. A quarantine treatment business in Fiji requires considerable reserves to be able to ride out such an eventuality and remain financially solvent. With the inevitability of climate change the frequency of severe floods and cyclones is likely to increase.

The aftermath of the coup of 2000 saw a disruption to production, interruptions to power supply, and closure of markets. As result only 290 tonnes of fruit were treated in 2000 compared with 370 tonnes the previous year. As a consequence the cost of treatment rose from 41 to 60 cents per kg resulting in a treatment gross margin of minus 20c/kg (the business lost 20c/kg for every kg treated). In that financial year NWC incurred a net operation loss of around FJD38, 000. Fortunately, the company had sufficient reserves in place to see it through until the next year when throughput increased strongly to 475 tonnes and the unit cost of treatment fell to 25.31 c/kg.

Prior to the severe floods of January 2009, NWC has been most fortunate not to have endured a major natural disaster since its inception. The last major disaster to affect wide areas of western Viti Levu was Cyclone Kina in 1992. Looking at the historical data a cyclone of Kina's "type" event could be expected every 5 to 6 years. Thus the floods of January 2009 were well and truly overdue. As consequence of the flood most treatments were completely suspended for the first 3 to 4 months. It will take up to a full year before throughput will return to normal levels. Thus without adequate reserves NWC would be facing financial crisis with continued operations depending on fickle government grants. Fortunately NWC put aside some FJD105, 000 in a fixed deposit to cover such a contingency.

5.3.9 Non quarantine treatment services for the fruit and vegetables export industry

As an essential and compulsory focus for export activities, NWC was seen to be ideally placed to provide a range of related services to its members. The Cooperative has been involved in a range of industry service activities. These have been:

- The operation of a small field service to improve quality.
- The bulk purchase of field bins.
- Supply of quality papaya seedling.
- Facilitating market access.
- Providing a focus for representing industry views and concerns.
- Facilitating the expansion of the papaya industry
- Facilitating the establishment of a new export industry - breadfruit
- Facilitating food safety certification to expand exports

These activities are discussed briefly in annex 3:

5.4 The projected future of NWC

With the completion of NWC's current capital investment program the Fiji fruit and vegetable industry now has the theoretical capacity to treat for export around 3, 800 tonnes of fruit per annum. A realistic maximum capacity is likely to be more in the order of 3,000 tonnes per annum.

With the Fiji fresh fruit and vegetable export industry starting to realise its full potential, treatment requirements may in the not too distant future exceed this expanded capacity. However, the NWC 'Strategic Plan for a Sustainable Future' recommended that NWC make no more investment in treatment capacity. The argument was that if the industry was exporting more than 3,000 tonnes of fruit, some of the larger exporters would have sufficient volumes to justify investment in their own quarantine treatment facility. NWC is a business established to service the fruit and vegetable export industry. It should not feel threatened by any future establishment of a competing private treatment facility. Such a development would be a measure of the success in being able to encourage sufficient production to justify private investment in quarantine treatment facilities. Competition in quarantine treatment would be beneficial to the whole horticultural export industry – reducing risk and hopefully reducing cost. In the longer term it is conceivable that through its own success NWC could do itself out of a job. However, more likely NWC would continue to provide treatment services for small exporters whose volumes don't justify their own facility.

The NWC 'Strategic Plan for Sustainable Future' recommended that for the foreseeable future the emphasis should now be on improving the efficiency of operations within the existing capacity and improving the quality and production of fruit coming from the field. A long term role for NWC was identified in facilitating market access for new commodities and new markets and in representing industry interests. These recommendations have been accepted by the NWC Board and endorsed by the 2008 AGM.

6 The HTFA quarantine treatment experience elsewhere in the Pacific islands

There has been HTFA quarantine treatment facilities established in Tonga, the Cook Islands, Vanuatu, New Caledonia and Hawaii. These experiences are discussed briefly below.

6.1 The Tongan experience

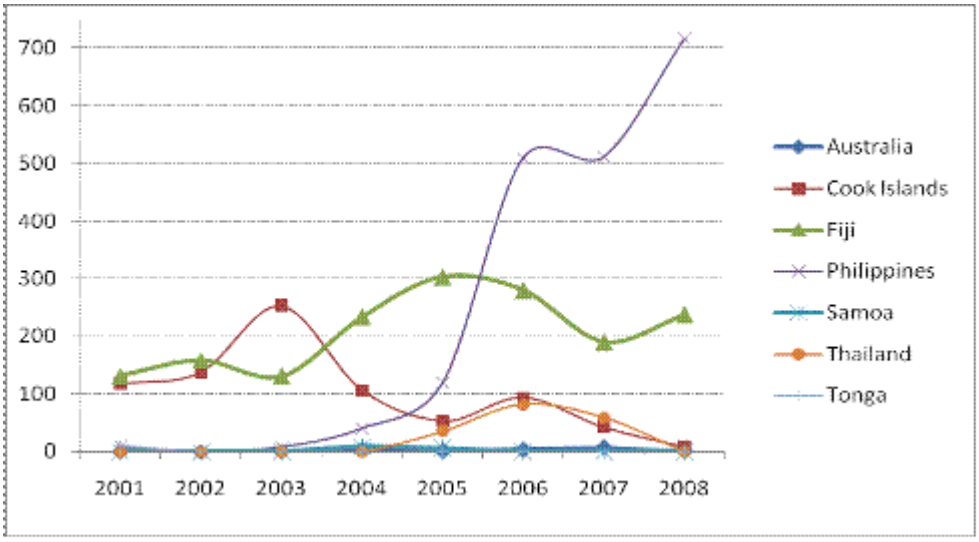
Both Fiji and Tonga were the direct beneficiaries of USAID's HTFA Project. The HTFA Project had two interrelated parts. The first part was to transfer the technology developed by the US Department of Agriculture (USDA). The second was to develop the business to commercially operate the quarantine treatment facility. USAID's requirement was that quarantine treatment be the responsibility of the private sector (industry). In both countries there was considerable resistance to the concept of private sector responsibility. However, in Fiji the concept prevailed and today there is a thriving and growing industry in the export of fruit fly host commodities. In Tonga, the Department of Agriculture took control of the HTFA facility at the completion of the USAID Project. NZAID funding was obtained to build a modern packing facility at the international airport in which an identical treatment facility to Fiji was installed. The Tongan HTFA Project was a failure. The table 5 below shows no exports of fruit fly host products from Tonga to New Zealand in 2005. In that year the value of Fiji exports of fruit fly products was NZD 2.8 million. Other countries that exported fruit fly host products to New Zealand in 2005 were: Cook Islands NZD46, 200 (papaya), New Caledonia NZD103, 400 (citrus) and Samoa NZD25, 300 (breadfruit).

6.2 The Cook Islands experience

The Cook Islands led the way in the development of the papaya market in New Zealand. At its peak in 1986, 555 tonnes were exported from the Cook Islands (Government of the Cook Islands). Since then, these exports have steadily declined to 253 tonnes in 2003. However, since 2003 there has been a precipitous drop in exports, with only 9 tonnes shipped in 2008 (figure 14). There have been no exports in 2009 (up until the end of August) (per. com. Daniel Mataroa,Nita Growers Association). Most of the papaya farms have now been abandoned or replaced by noni and vegetables. The availability of suitable land on Rarotonga has become an increasing constraint for Cook Islands agriculture. However, a papaya replating program has begun – with 5,000 trees planted by 20 growers in April 2009 (per. com. Daniel Mataroa Nita Growers Association). Another round of planting 5,000 trees is scheduled for November 2009. The Nita Growers Association hopes to start exporting a tonne a week in 2010.

The Cook Islands HTFA facility began as a Department of Agriculture initiative. It is now managed and run by the Rarotonga Nita Growers Association. However, the facility requires recertification. Changes are currently being made to the harvesting methods to reduce handling. The major problem faced by the Cook Islands facility has been the dependency on one commodity - papaya. The high fixed cost structure of a quarantine treatment operation means that the working capital position of the business can deteriorate rapidly if there major disruption to produce supply. This is exactly what happened with Fiji's great flood on January 2009.

Figure 14.Papaya imports to New Zealand - 2001 to 2008 (tonnes)



6.3 The Samoa experience

A research/semi commercial HTFA facility was established at the Department of Agriculture's Atele Horticulture Centre in 2002 and began operations in 2003. The facility has the capacity to treat up to 300 kgs of fruit in a run. The intention was first to develop treatment protocols and BQAs before establishing a commercial scale unit at the Faleolo Airport. BQA have been negotiated with New Zealand for papaya and breadfruit and successful trial shipments of both products have been made (figure 15).

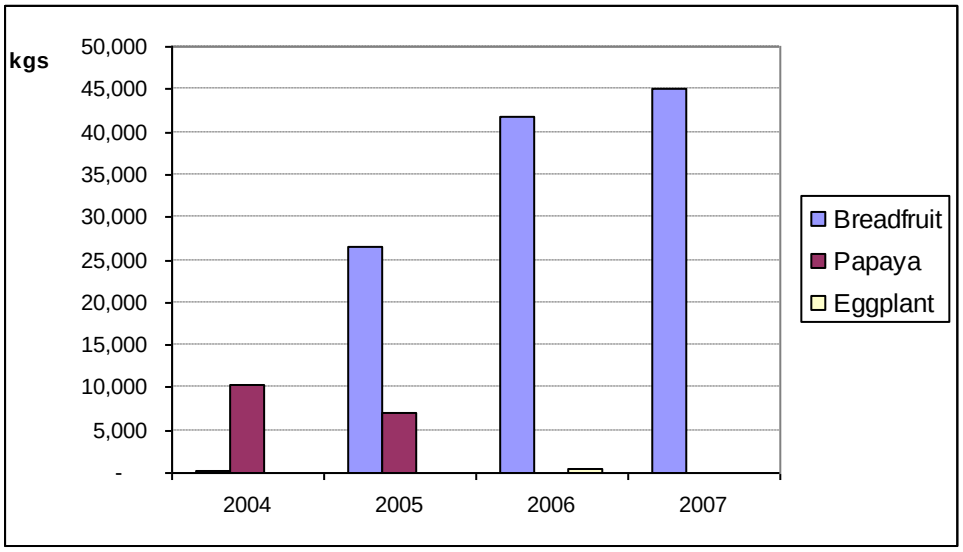
A feasibility study for the commercialization of Samoa's HTFA operations conducted in 2007 concluded that the only way for Samoa to successfully develop commercial exports of fruit fly host products was through an appropriate form of public private sector partnership (McGregor 2007). The feasibility study suggested that two forms of PPPs to operate in parallel:

- A modest sized (2 tonne capacity) HTFA facility owned and operated by the industry with government/donor funds used to meet start-up costs (The "Fiji model").
- The Atele treatment equipment to be leased to a business already involved in related activities.

The commercial HTFA feasibility study saw breadfruit as the core product with papaya being a subsidiary product. However, no action has been taken on these recommendations. When the Atele facility was established it was expected that papaya might be the core product for a commercial HTFA facility. Markets were identified in New Zealand. The agronomic conditions prevailing in Samoa were seen as quite similar to those of the main papaya growing areas in Hawaii. However, the performance of papaya in Samoa to date has been disappointing. Major fungal diseases (particularly root and stem rots) have been encountered with the Sunrise variety that has been planted. Also under Samoan conditions the shelf life of the fruit has been quite poor. In contrast Fiji is proving itself to have a comparative advantage in growing this variety.

Work continues at Atele to select papaya varieties that have good eating and keeping qualities and have disease resistance. Some encouraging initial results are being achieved in identifying a larger red fleshed variety that may have excellent niche market opportunities in New Zealand, particularly if it can be branded as a Samoa product. If this selection is successful, papaya will be an important complementary product for a future commercial HTFA facility. However, for the foreseeable future it is unlikely to be the core product that was originally envisaged.

Figure 15: Fruit treated by the Atele HTFA facility: 2002-2007



Source: Atele HTFA facility records

The Atele HTFA facility is nowhere near being financially viable and it was never intended be. The unit cost of treatment is very high (estimated at almost 1 tala/kg treated[13]). The reason for this is that the throughput is low and intermittent compared with high overheads of operating the facility. In common with government operations all revenue earned from treatment is paid into Government's consolidated revenue. Thus there are no readily available funds to meet immediate needs such as repairs and maintenance. Such an arrangement is unworkable for an activity of this nature. In the face of outside pressure Atele was forced to reduce treatment charges to rates well below what could be conceivably seen as economical. This has set an unfortunate precedence. Exporters have become use to this economically low rate, making it difficult for any future business to set treatment rates that are economically realistic.

6.4 The Vanuatu and New Caledonia experience

Vanuatu and New Caledonia both have commercial scale HTFA facilities. The Vanuatu facility is owned by a local supermarket owner. It has a large capacity but has had insufficient throughput to approach viability. Small quantities of papaya, citrus and eggplant have been exported to New Zealand. The constraints have been availability of supply and limited airfreight capacity to New Zealand.

The New Caledonia facility is run as a quasi government operation used to treat citrus for export to New Zealand. No data is available to assess performance and viability.

6.5 The Hawaii experience

Hawaii, in 1990, exported 18,300 tonnes of papaya to the US mainland utilizing HTFA treatment. This involved more than a dozen private exporting packing sheds. There were a further 8,300 tonnes exported to Japan using a vapour heat treatment. However, in late 1992 the industry was decimated by with the establishment of papaya ringspot virus (PRSV) in the main production areas on the Big Island of Hawaii.

In recent years development of genetically modified (GMO) papaya varieties that are resistant to PRSV has enabled the Hawaii papaya industry to arrest the decline in production. However,

[13] The costings are based on actual data from the Atele facility supplied by the Manager Pueata Tanielu

HTFA is no longer the quarantine treatment of choice is Hawaii. Now most fruit fly host products shipped to the US Mainland are irradiated. There is one large irradiation treatment facility operating on the Big Island, with another proposed for Oahu at the international airport. All but one of Hawaii's HTFA plants have closed[14]. Fiji's NWC was able to purchase its second treatment chamber from one of these businesses.

Hawaii's preference for irradiation is based on the following considerations:

- Irradiation, with Hawaii's devastating fruit flies,[15] allows for harvesting of riper (superior flavoured fruit) provided other field control measures are adopted. This is not relevant to most PICs, since fruit flies here only attack fully ripe fruit.
- Treatment time is much shorter (a few minutes compared with 5 to 6 hours for HTFA)
- Treatment can be undertaken in cartons ready to ship. HTFA requires packing after treatment in plastic crates or bins.

Irradiation is not a viable option for PIC exporters due to scale, capital cost and technical requirements. Equivalent results are achievable using HTFA technology.

The only HTFA facility still operating in Hawaii is located on the island of Molokai. The facility is operated by Kumu Farms and represents one of the bright spots of the papaya industry in recent years. The company exports certified organic papaya to the US mainland and Canada (irradiation is not acceptable to organic markets). The Kumu farms papaya production has doubled over the last 5-years, to reach 550 tonnes in 2005. Kumu Farms certified organic operation involves a 125 acre nucleus farm and 5 outgrowers totaling some 50 acres. The absence of PRSV on Molokai enables these organic growers to plant Sunrise, a non GMO variety that is suited the Island's soil conditions and is acceptable to organic markets.

All of Hawaii quarantine treatment facilities (HTFA, irradiation and vapour heat) are privately operated.

[14] Two vapour heat treatment facilities remain in operation specifically to service the Japanese market, that does not accept irradiated fruit.

[15] The main fruit fly pest for papaya in Hawaii is the Oriental fruit fly (*Bactrocera. Dorsalis).* This fruit fly, which is not present in Samoa, attacks papaya at the colour break and ¼ ripe stage. Thus when heat treatments are used it is necessary to harvest papaya green, which has significantly less flavour.

7 The value chain for Fiji's fruit fly host horticultural export products: the case of papaya

Papaya together with eggplant are the two main horticultural export products. Papaya in Fiji has somewhat complex value chain involving a large number of actors. These can be listed as:

- Six seedling suppliers
- Papaya Farmers (165 registered farmers in the Sigatoka Valley, 22 farmers along the Sigatoka coast, 12 Nadi-Lautoka corridor, and 20 Dawasamu - Tailevu)
- Research Partners (Ministry of Primary Industries Research Division– Sigatoka Research Station (SRS) and the ACIAR Fiji Papaya Project)
- Extension Partners (Ministry of Primary Industries Extension Division, Taiwan Technical Mission (TTM)
- Domestic Traders (road side sellers, market vendors, middlemen)
- Transporters and handlers (NWC staff, exporter staff, Air Terminal Services (ATS, freight companies)
- Exporters (9 exporters – with 4 handling most of the papaya)
- Fiji Quarantine and Inspection Service (FQIS)

7.1 Improving the papaya value chain to meet the requirements of the market

In 2009 comprehensive studies were undertaken of the market for Fijian papaya in New Zealand, Australia, US and Japan:

- New Zealand Market Study - Kyle Stice, Andrew McGregor, Sant Kumar and Vinesh Prasad (2009).
- Australian Market Study - Kalara McGregor, Andrew McGregor, Lex Thomson and Kyle Stice (NZ).
- United States Market Study – Kyle Stice (2009).
- Japan Market Study – Kalara McGregor (2009).

Funding for these studies was provided by the EU/SPC Facilitating Agricultural Commodity Trade (FACT) Project.

The size of these markets was projected under two scenarios:

- The Fiji industry continues as is – the status quo remains.
- There is significant improvement in the Fiji industry.

For the New Zealand and Australian market the status quo means

- Fiji papaya is not sold in the major super market chains.
- Fiji's largest exporter sells to an importer/wholesaler who services some of the independent chains and speciality stores.
- A few other Fiji exporters mainly sell to Indo-Fijian importers, who sell in their own retail outlets and other ethnic stores.
- The inherent quality of the Fiji papaya is good – however, generally the grading and presentation of the fruit is generally inferior to that of Australian papaya and Dole papaya in New Zealand.
- All shipments are by air.

Should the status quo remain very limited growth is projected in the New Zealand and Australian markets (figure 16 and 17)

Figure 16: The projected New Zealand market for Fijian papaya (tonnes)

Year	1	2	3	4	5
Status quo - Fiji industry remains the same	250-270	270-300	300-340	340-390	390-450
Substantially improved Fiji industry	270-300	300-350	350-450	450-1,100	1,100-2,300

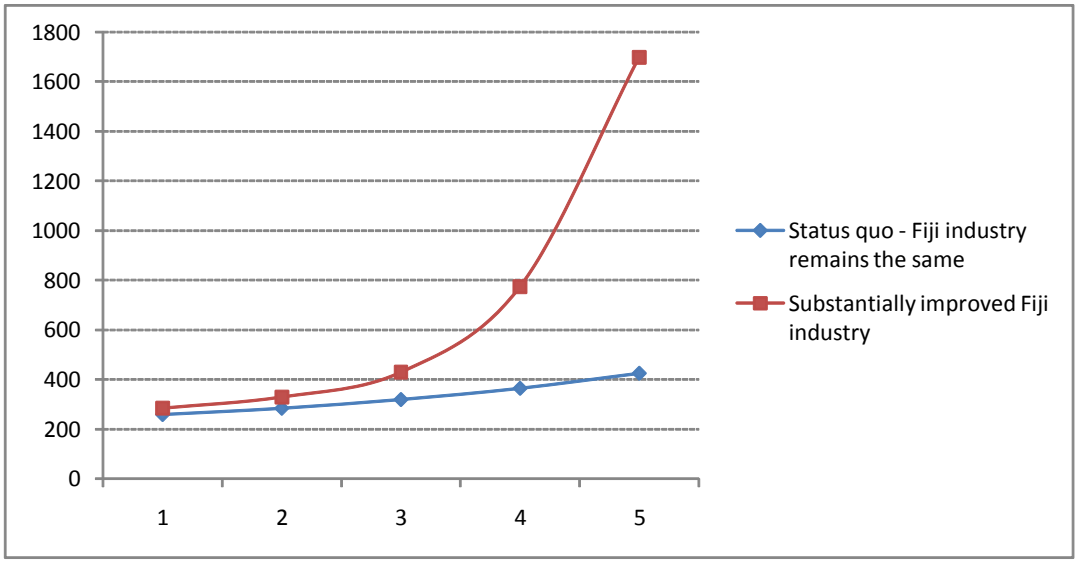
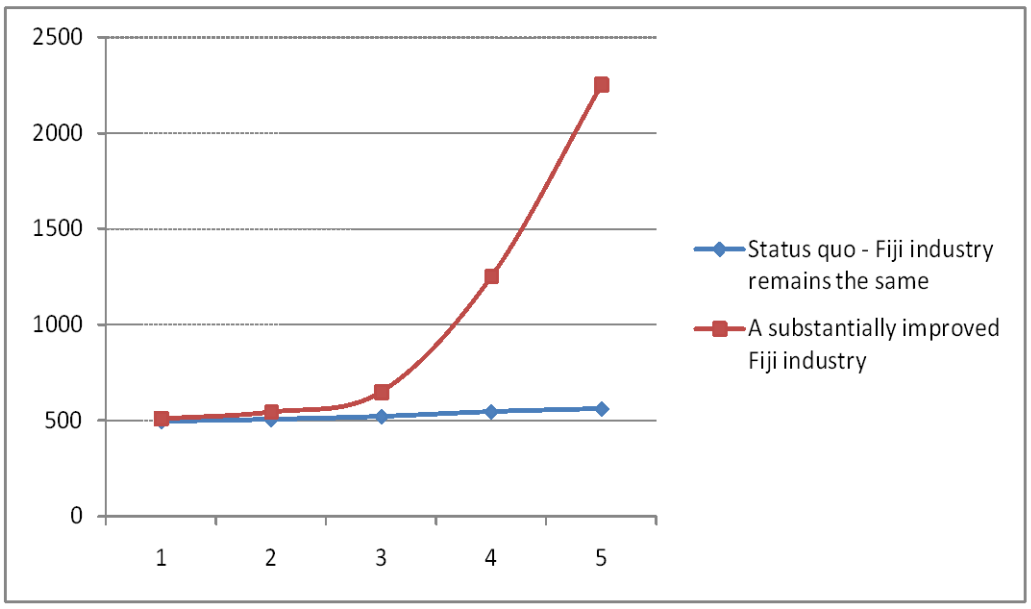


Figure 17: The projected Australian market for Fijian papaya (tonnes)

Year	1	2	3	4	5
Status quo - Fiji industry remains the same	490-500	500-510	510-530	530-550	540-580
A substantially improved Fiji industry	500-520	530-560	600-700	1,000-1,500	1,500-3,000



For the Japanese and US market maintaining the status quo would result in little or no market opportunities.

The studies estimate a large market available if there were substantial improvements made along the papaya value chain. The estimated market for the four destinations is summarised in table 11.

Table 11: Estimated available market for Fijian papaya, if there are substantial improvements made along the value chain

	Current market	5 year projection	
New Zealand	270-300	1,100-2,300	
Australia	500-520	1,500-3,000	
US	100-200	200-300	
Japan	50-100	250-300	
	920-1120	**3,050-5,900**	**tonnes**

The key to substantially expanding Fiji papaya market is to enter the supermarket segment, from which Fiji papaya is currently excluded.



This requires action on a number of broad areas to make Fijian papaya competitive:

- Fijian papaya becoming more price competitive
- Improving the quality of Fijian papaya
- Improving the marketing of Fijian papaya

The market study identified the specifics of each area as:

Becoming more price competive

- Reducing the price paid to growers through increasing on-farm productivity (reducing farm gate prices and increasing farmer income seen as compatable)
- Reducing the cost of quarantine treatment and clearance
- Reducing transportation costs (moving to sea freight).

Improving quality

- Control of postharvest diseases on the farm
- Harvest and postharvest handling
- Grading
- Packaging and labelling

Improving marketing

- Branding of “Fiji red papaya”
- In-store promotion and customer awareness
- Food safety and quality certification

The exporters were identified as the key drivers in making the necessary improvements in the marketing chain to substantially expand the market.

8 Key Findings and Discussions

8.1 Factors attributing to the success of NWC

A number of key factors have contributed the success of NWC. These are:

- The quality and continuity of management. The same Chairman and General Manager have served from the outset.
- There has been no government interference in the operations of the business[16].
- There has been an appropriate public private sector partnership.
- Shareholders have not interfered in the day to day operations.
- Quarantine treatment fees have been set at an economic rate from the outset. This has enabled the business to run profitably and retain a sufficient level of earning to fund repairs and maintenance, to invest in the expansion of the business and to make "rainy day" provisions for events such as cyclones and trade bans.
- The business was able to quickly move to a level of plant utilisation that yielded to a positive cash flow. The key to this was the introduction of eggplant in 1998 to complement and then surpass papaya.
- The ability to implement a succession plan to ensure the sustainability of operations.

8.2 Key lessons learnt from other quarantine treatment operations in the region

The key lessons from the various quarantine treatment operations in the region are:

- A necessary condition for the success of a commercial scale treatment facility is that it must be run by the private sector.
- The division of responsibility between the quarantine treatment business and the quarantine service.
- As with any other business success depends on good management
- Financial viability depends on maintaining a sufficient level of throughput.
- The business must be able to charge economic rates for treatment if it is to be sustainable.
- A place for public private sector partnerships

Each of these key lessons is considered briefly below.

Must be run in the private sector

The worldwide experience is that successful commercial quarantine treatment facilities must be run as a business. A comparison between Fiji and Tonga provides strong supporting evidence for this. Both obtained identical treatment facilities at the same time and were recipients of the same technical assistance. The Fiji facility is owned and operated by an industry owned business. The Tonga facility was operated by the Department of Agriculture. Fiji is now exporting over 1,000 tonnes of fruit fly host products annually and has the capacity to treat 3,000 tonnes of fruit annually. Tonga exports no fruit fly produce. This is despite Tonga having highly capable market orientated farmers.

[16] Initially a delegation of exporters petitioned the Ministry of Agriculture to take over the facility because they did believe that should pay for this service. In the past they had received free treatment, albeit unreliable, from government. The Permanent Secretary at the time rejected this requested and that was the last of such an occurrence.

Private sector ownership and operation, however, is not itself a guarantee of success as the experience of Vanuatu has shown.

There are two inherent reasons why this sort of a business cannot be sustained in a government system regardless of how competent the management is. These can be listed as:

- A quarantine treatment business must be able to collect its own funds and utilize them in a timely fashion as required. It must be able to respond rapidly to circumstances. If there is a breakdown the business must be able to arrange repairs and spare parts immediately. It cannot await release of funds through a government bureaucracy[17].
- There is an inherent conflict of interest if the government operates the quarantine treatment facility. The government through its quarantine service must certify that correct operations have been followed in accordance with the bilateral quarantine agreement. Quarantine certification is a mandatory responsibility of government.

The division of responsibility between the quarantine treatment business and the quarantine service

The division of responsibility between the treatment business and Government's quarantine service are outlined in the table 11 below. The quarantine treatment business cannot do both, it cannot audit itself.

Table 11.The division of responsibility between the quarantine treatment business and the Quarantine Service

Activity	Responsibility		Comments
	Quarantine Service	Treatment Business	
Final grading of fruit brought to the facility		✓	Substantial grading will be undertaken by exporters prior to transportation to the facility
Initial quarantine inspection of the fruit	✓		largest fruit probed and place in "cold spot" in bin as specified by pre-determined thermal map
Selection and probing of fruit	✓		
Placement of the fruitin to treatment bins		✓	
Placement of bins in treatment chamber		✓	
Locking of chamber and maintenance of keys	✓		
Access to computer programs and security codes	✓		The importing country will also have a copy of the program used.
Starting the run		✓	Involves typing the name of the operator, the Quarantine officer, the run number, and selecting the particular fruit from the menu.
Monitoring the 5 - 6 hr run.		✓	Problems that could arise include power outage, faulty probes, and the computer failure.

[17] In Fiji in 1986 a whole papaya export season was missed when the seal on the Department of Agriculture operated EDB treatment chamber had to be replaced. It took 2 months for the funds for this $1,000 seal to be approved by the Ministry of Finance. As a result a number of exporters went out of business.

Decision to discontinue run if problems encountered		✓	It is the responsibility of the operator to notify the quarantine officer if problems with power, the probes, computer etc. arise. Quarantine officer would have to be on call during the duration of the run.
Final grading and packing of the fruit		✓	Exporters will be permitted to observe the packing
Final inspection before sealing and marking of boxes		✓	
Marking, weighing, and sealing of boxes		✓	
Placing the Quarantine seal with run number on box	✓		
Loading the air cargo (or sea) containers		✓	
Issuance of Phytosanitary certificate with computer print-out attached.	✓		

Other related activities

Activity	Responsibility		Comments
	Quarantine Service	Treatment Business	
Building and equipment maintenance together with sanitation		✓	Particularly the fly free zone. This would include the purchase of fruitfly traps and sprayer.
Monitoring building and equipment maintenance and sanitation		✓	Must always meet the standards in the agreements with importing country. This would include the placement of fruitfly traps.
Specifying production practices		✓	Including site selection, field sanitation, bait spraying etc.if required by the importing country. There will be an agreement between growers and the quarantine treatment business.
Monitoring compliance of production practices		✓	Growers and exporters who fail the field inspection would be suspended until the problem was corrected.
Maintenance of necessary fruit fly research and surveillance programs	✓		
Entering into agreements with importing countries for use of the HTFA treatment for papaya and other fruits.	✓		

Financial viability depends on maintaining a sufficient level of throughput

The regions successful HTFA operations have been Natures Way and Kumu Farms in Hawaii. Both enjoy a high level of utilisation of their facilities. NWC facility has 3 treatment chambers that operate 6 days a week, treating over 1,000 tonnes annually. With the investment in a fourth chamber and the expansion of the building, NWC will have the capacity treat 3,000 tonnes annually. Kumu Farms has a single wide-body chamber is fully occupied treating some 400 tonnes of papaya annually.

A quarantine treatment enterprise has a high proportion of fixed costs; the most important items being administration (salaries), depreciation of fixed assets, insurance expenses and large once off expenditure items (major repairs, certification and confirmatory tests). NWC and

Kumu Farms have been able to spread their fixed cost overheads over a relatively large volume of produce and thus have low unit costs of treatment.

The relationship between throughput and financial viability can be seen in NWC's financial results over the period 1997 to 2008 (table 12). In1997, the first year of operations, NWC treated only 33 tonnes of papaya at a cost of 94.2 cents per kg treated, with exporters paying 40 cents per kg treated. There was a negative gross margin per kg treated was of 54.16 cents and the total negative gross margin was $17,872. In second year of operations the situation improved somewhat with 183 tonnes of papaya treated. The gross margin improved significantly but still remained negative. It was not until 1999 that positive gross margin were achieved. This was a direct result of eggplant being certified for export to New Zealand and throughput increasing to 391 tonnes. Just when it seemed that NWC had turned the corner in terms of financial viability the 2000 coup occurred and trade bans were imposed on Fiji during the peak exporting period. As consequence throughput in that year fell back to 290 tonnes and negative gross margins returned. Fortunately these trade bans were short lived and through put has continued to expand to reach over 1,000 tonnes 2006, with healthy gross margins resulting. These margins were in turn reinvested in the business.

Table 12. The relationship between financial viability and treatment throughput

Financial Year	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Treatment (kgs)	33,037	182,697	391,329	370,000	290,315	475,000	459,000	461,000	620,000	825,000	1,197,000	1,070,000	864,000
Treatment charge (c/kg)	40	40	40	40	40	40	40	40	40	40	40	40	37
Revenue payable ($)	13,215	73,079	156,532	148,000	116,126	190,000	183,600	184,400	248,000	330,000	478,800	428,000	319,680
Revenue paid ($)				167,650	139,544	136,387	206,134	177,847	222,780	296,129	390,472	451,574	230,734
Total expenditure ($)	31,108	85,265	142,874	153,041	173,421	120,207	175,199	172,155	230,783	190,750	283,851	291,277	169,603
Unit cost of treatment (c/kg)	94.16	46.67	36.51	41.36	59.74	25.31	38.17	37.34	37.22	23.12	23.71	27.22	19.63
Treatment gross margin (c/kg	-54.2	-6.7	3.5	-1.4	-19.7	14.7	1.8	2.7	2.8	16.9	16.3	12.8	17.4
Net operating profit before tax ($)				14,615	(33,877)	16,180	32,107	5,692	29,039	79,461	80,280	127,503	79,601
Retained earnings ($)				14,615	(33,877)	16,180	28,547	5,692	22,951	47,354	55,393	18,175	45,616
Trade debtors at end of FY										71,378	87,802	125,506	150,641

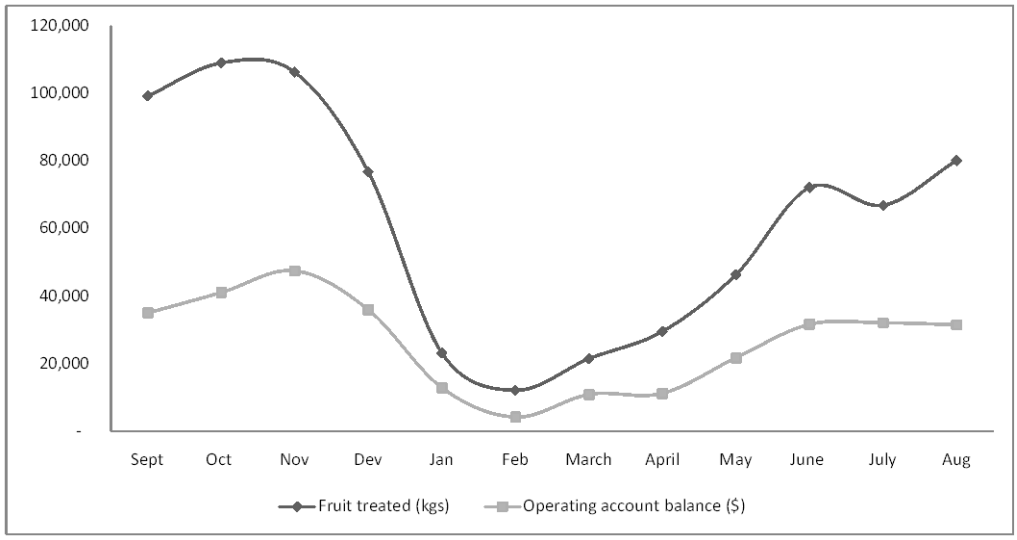
* Derived from NWC Audited Accounts - for Financial Year ending June 30th, except for 2008, which is taken as the period ending December 30th 2007.

The high fixed cost structure of a quarantine treatment operation means that the working capital position of the business can deteriorate rapidly if there is a major disruption to produce supply. This is exactly what happened with Fiji's great flood on January 2009. In the six months leading to the flood there was a steady increase in throughput. At the end of 2008 NWC had a healthy operating account balance. The flood subsided in mid-January and throughput fell away sharply. In February 2009 only 12 tonnes were exported, the lowest monthly throughput in more than a decade. By month's end the company's operating balance had fallen to a precarious FJD 4,000 (table 13). A steady increase in throughput from March onwards, combined with austerity measures, has enabled financial stability to be restored. For the period Sept 2008 to August 2009, there was .975 correlation between NWC's operating account closing balance and the fruit treated for that month.

There are important lessons here for other would be quarantine treatment enterprises in the region. For a commercial Samoa HTFA operation, for instance, the core export crop for Samoa is likely to be breadfruit. However, present airfreight capacity to New Zealand and seasonal variation in supply may not initially provide sufficient throughput for financial viability. There is also need for a second product to utilise the facility during down periods in breadfruit availability. Indications are that vi is the best candidate for such a complementary product. However, a BQA for vi has yet to be negotiated with New Zealand despite the available market and proven suitability of the product for HTFA treatment.

Table 13 The impact of the January 2009 flood on NWC financial position.

	Sept	Oct	Nov	Dev	Jan	Feb	March	April	May	June	July	Aug
Fruit treated (kgs)												
Papaya	35,970	52,731	59,441	40,763	10,882	7,628	9,753	16,956	23,439	18,238	13,173	13,018
Eggplant	53,078	50,202	41,003	33,099	9,888	3,996	11,753	12,575	22,906	53,883	53,704	66,051
Mango	10,175	-	5,447	943								1,053
Breadfruit		6,058	318	1,955	2,403	558						
Total	99,223	108,991	106,209	76,760	23,173	12,182	21,506	29,531	46,345	72,121	66,877	80,122
Cash flow ($)												
(Operating account month end closing balance)	$ 35,060	$ 41,064	$ 47,550	$ 36,004	$ 12,916	$ 4,212	$ 10,952	$ 11,243	$ 21,776	$ 31,683	$ 32,143	$ 31,569



8.2.1 The business must be able to charge economic rates for treatment

To be sustainable a quarantine treatment business must be able to set treatment fees at a level high enough to provide a sufficient margin to cover operating costs (labour, energy, management), allow for repair and maintenance, provide for contingencies such as cyclones, fund the replacement of equipment and to invest in future expansion. In the first few years of operation this may be difficult to achieve. Thus the business must have more than sufficient start-up working capital it carry it through this initial period until an adequate positive gross margin is generated. The business must be able to set rates based on its cost structure and its projections of future throughput. It must be able to do so free from political and industry interference.

8.3 Technical, intuitional and policy issues

8.3.1 A place for public private sector partnership

As the Fiji experience has shown it is highly unlikely that any commercial bank operating in the Pacific islands would be willing to fund the start up cost of establishing a quarantine treatment business or even for the subsequent expansion of the business. The commercial banks throughout the region have by and large withdrawn from the agricultural sector seeing it as too risky and the returns too low. The record of the region's Development Banks in the agriculture sector is little better. Even now NWC, with a 13 year track record and significant cash reserves, would unlikely be in a position to be able to secure substantial commercial bank finance for major expansion in treatment capacity. To expand annual treatment capacity from 1,000 to 3,000 tonnes, required an investment in excess of FJD 1 million. Despites NWC proven track record the business would have very little in the form of tradable collateral to offer a lending institution. NWC owns no land. It has a sub leased land from the Ministry of Agriculture's Quarantine Department, who in turn leases the land from the Civil Aviation

Authority of Fiji (CAAF). High Temperature Force Air (HTFA) quarantine involves the use of highly specialized equipment. The only commercial HTFA facilities operating today are at NWC and on Molakai in Hawaii. Thus this equipment would have little or no salvage value other than for scrap. NWC Board of Directors serve in an honorary capacity and and as a result are unwilling to provide personal guarantees for any loan secured by the business. Finally horticultural exports are a highly risky business. NWC treatment throughput and thus cash flow and ability to service a loan is particularly vulnerable to natural disasters as the aftermath January 2009 vividly illustrate (table 8). In these circumstances there is little wonder that NWC's capital investment program has been funded by retained earnings and public funding (both government and donor).

Even if a start-up loan could be secured from a commercial bank, the terms would have to allow for a significant moratorium on repayments until there was sufficient throughput to adequately service the loan. It is also highly unlikely that the small and micro enterprises (SMEs) that typically participate in the Pacific islands agricultural sector would have sufficient funds available to make such investments in their own right. Operating a quarantine business is unlikely to be sufficiently profitable and too risky to attract investors outside the agricultural sector.

On the other hand a successful quarantine treatment business offers the prospect of substantial economic and social returns as shown by the example of NWC. The major benefits lie in the employment and livelihoods created by the investment. In Fiji the livelihoods of small farmers in the cane growing areas have been enhanced by around $F1 million annually. A threefold increase in this amount can be expected in the next few years. This represents an outstanding return on an initial invest of around FJD500, 000 in public funds.

Successful quarantine treatment in the Pacific Islands requires a public private sector partnership (PPP). The public sector cannot be successful on its own nor can the private sector. However, through appropriately working together success can be achieved. The appropriate role and contribution of the two parties in the PPP is summarised below. Comments are made in italics on the performance of the Fiji quarantine treatment PPP in terms of each of these roles.

<u>The public sector</u>:

- Facilitates the initial transfer of specialised technology to the fruit and vegetable export industry. ***Evaluation of the performance of the Fiji PPP*** - ***Excellent*** (*Through the USAID's Commercial Agricultural Development Project the Fiji industry was able to obtain access to the HTFA technology that was developed by the USDA).*
- Provides start-up capital (equipment, building, land and some working capital) and contributing to expansion capital. ***Evaluation of the performance – Excellent*** *(Government and donors fulfilled this role for NWC).*
- Facilitates the timely negotiation of bilateral quarantine agreements that opens up markets for the business. ***Evaluation of the performance – Poor*** *(Government agencies (both Fiji and importing countries) failed in this area, resulting in the private sector having to take on a proactive facilitating role).*

<u>The private sector</u>:

- Owns and operates the facility on behalf of the fruit and vegetable export industry. ***Evaluation of the performance of the Fiji PPP - Excellent***
- Provides a significant contribution to start-up working capital by taking shares in the business. ***Evaluation of the performance - Inadequate*** *(The cost of membership shares were set too low).*
- Generates the retained earnings to maintain the business and to invest in future expansion. ***Evaluation of the performance - Good***

8.3.2 The appropriate business structure

A conditionality of USAID in providing technical and financial assistance to establish quarantine treatment facilities in the Pacific islands was that they be industry owned and managed. There were two alternative business models available for such an industry owned and managed business. It could either be established as a registered Cooperative governed by the Cooperative Act or a limited liability company governed by the Companies Act. Under both option those who used the service (the exporters and farmers) would be the shareholders. The cooperative option was selected and Natures Way Cooperative (Fiji) Ltd was registered in August 1995. The main reason for selecting the cooperative option was that there would be no barriers to entry for future exporters and growers becoming shareholders and having access to the quarantine treatment services. With a limited liability business there was a risk that the original shareholders could exclude future industry entrants from having access to quarantine treatment. Another consideration was the 7 year tax holiday on offer to cooperatives. The business advisor under the CAD Project, John Kreag, had a strong background in the US Cooperative Movement, which boasts some of the largest and most successful agribusinesses in the world[18]. His influence was clearly a factor in the choice of the cooperative option.

Cooperatives in Fiji, and elsewhere in the Pacific islands, do not have a particular good record. The major shortcoming is usually management. However, NWC has been fortunate with respect to management.

The Chairman of the Cooperative from the outset has been Tim Casey. Tim Casey is the Managing Director of South Development Company (SDC), which has become the Leaf Growing Division of British American Tobacco (Fiji) Ltd., (BAT). SDC and now BAT Leaf Growing Division, is a smallholder tobacco farmer management company. SDC, at the time of NWC's foundation, supported 50 papaya farmers as part of the company's diversification program. While BAT is no longer directly involved in papaya Tim Casey has continued on as NWC Chairman. BAT has provided ongoing assistance to NWC as part of its broader community responsibility program. This has included making the services of Tim Casey available as Chairman. In NWC's formative years SDC's support included providing critical accounting and record keeping services to the NWC.

The Cooperative has also had the same General Manager from the outset. Sant Kumar had previously been Director of Extension in the Ministry of Agriculture. He had wide experience in the fruit industry and operated a commercial nursery which supplied the papaya industry with seedlings. These activities were complementary, which allowed the manager to be paid on a piece rate (per treatment) basis. This arrangement allowed overheads to be minimised when throughput was low. Sant Kumar retires as GM at the end of 2009, when he will be replaced by Michael Brown. Michael Brown is currently understudying Sant Kumar in his capacity as the newly appointed Field Officer. It seems that a smooth management transition will be made and Natures Way will be able to avoid the problem of key person dependency so often associated with successful small businesses in the Pacific islands.

Operating as a formal registered cooperative has served the quarantine treatment business reasonably well in its 13 years of operation. There have been two major benefits:

- Under the Fiji Cooperative Act, a new cooperative is entitled to a 7 year tax holiday[19].

[18] These include well known brands the Land O'Lakes (dairy products), Blue Diamond (almonds) Sunkist (citrus) and Welch (fruit juices).

[19] A discussion with Professor Ropate Qalo, a cooperative expert from the University of the South Pacific, indicates that the NWC is still paying too much in tax due to a misunderstanding of the Cooperative Act. Professor Qalo pointed out that under the Cooperative Act, NWC should only be liable for tax on 25% of its operating profits.

- There has been a steady increase in exporter members of NWC. A principle objective of cooperative is to expand its membership. This would not necessarily be the case for a limited liability company providing services.

However, there have been a number of short comings and problems arising from NWC being a cooperative. These are discussed briefly below:

- **A negative attitude toward cooperatives**. There was initially a negative perception of NWC as a business because it was a cooperative. This stemmed from what was seen as the poor track record of cooperatives in Fiji and the Pacific islands. In 1997 NWC approached the World Bank's South Pacific Project Facility for assistance in seeking start-up working capital after the withdrawal of USAID. This request was turned down by the responsible officer on the grounds that NWC was a cooperative and thus was unlikely to succeed[20]. Also the Manager of Fiji Development Bank (FDB) turned down a request for working capital on the same grounds. This response was particularly disappointing given that the then FDB GM had previously been the Director of Cooperatives and was a strong advocate of indigenous Fijian participation in business. The record of cooperatives in Fiji and the Pacific islands has by and large not been particularly good. However, this has been more due to management, rather than the business model under which they operated. NWC has had excellent management and thus has been successful. NWC is now recognized as a successful business. However, being a cooperative remains a constraint in terms of raising commercial loan finance. The problem lies with loan guarantees that can be provided. As a cooperative the office bearers at NWC act in an honorary capacity and as a result are unwilling to provide personal guarantees for loans. This problem of loan security is compounded by the fact that Nature's Way does not own the land where it operates[21]. Furthermore HTFA equipment is very specialized and would have little or no salvage value it was sold and would provide limited loan security.

- **Administrative support provided by the Department of Cooperatives was inadequate.** The growth of NWC into a substantial agribusiness business outgrew the auditing and administrative support provided by the Department of Cooperatives, which was much more tailored to consumer cooperatives and other small businesses. As a result audited accounts were regularly late. Incorrect advice provided on taxation and VAT requirements caused subsequent problems with the Fiji Revenue and Customs Authority (FIRCA). It was only with the appointment of a professional accounting firm that potentially damaging taxation issues were resolved. NWC has faced ongoing issues with FIRCA on how government and donor grants are treated[22].

- **Under capitalization**. Given the size of the business the equity of shareholders is very low. Growers pay $52 for a share in NWC and exporters $202 for a share. The total share capital in the business is $12,640, compared with total shareholder funds of $1,087,627. However, being a cooperative it is very difficult to attract additional equity other than issuing bonus shares in lieu of dividends. On three occasions NWC has paid a dividend to its shareholders – with members given the option of receiving cash or receiving the equivalent in bonus shares. Invariably grower shareholders have opted for the cash and the exporter members have taken up the bonus shares.

- **The risk of an unjustified change in management**. As a cooperative all members have equal voting rights regardless of their contribution to the business. Most share holders

[20] It is ironic than more than a decade later this same officer was on the committee that approved the NWC Challenge Fund grant.

[21] The land is leased from Ministry of Agriculture's Quarantine Department. Thus we cannot offer land as security for a loan

[22] FIRCA is insisting that these grants be treated as income. This matter remains under dispute.

have low levels of formal education. The Board has been subject to re-election every three year. However, according to the Cooperative Act an election could be called on an annual basis. These arrangements are tailored to simple businesses such as village consumer cooperatives and similar small businesses. However, NWC has grown into a relatively sophisticated agribusiness. The NWC Board and Management are potentially subject to change based on factors other than sound business considerations. Changes can occur due to alliances and whims of poorly informed people who may have only a limited direct financial stake in the business. This represents a major ongoing risk factor for an expanding agribusiness whose viability depends on maintaining economic charges for services and retaining a high level retained earnings for capital investment and "rainy days".

NWC has grown from a small service cooperative to a mature agribusiness whose turnover will soon exceed a million dollars annually. The longer term sustainability of the business depends on being able to:

- maintain a high level of retained earnings;
- to attract more equity investment on the part of its shareholders;
- maintain high quality management that make decision decisions that are in the long term interest of industry.

These objectives would be more likely to be achieved if NWC was a limited liability company that operated under the Companies Act. It would still operate as an industry owned business, in which the exporters and farmers are the shareholders. However, the transformation of Natures Way Cooperative (Fiji) Ltd. to Natures Way (Fiji) Ltd., would first require the liquidation of NWC before a limited liability company could be established. Such a liquation would need to follow the stringent requirements laid down in Fiji's Cooperative Act. There is a risk that in the process the actual outcome may differ from the intended outcome. The risk of unintended consequences is too high to justify liquidation. Thus it is recommended that Natures Way remain as Natures Way Cooperative (Fiji) Ltd., under the Cooperative Act.

It is encouraging that USP's Professor Qalo is undertaking a review of Fiji Cooperative legislation and institutional arrangements. Discussions with Professor Qalo indicate that he will be recommending that the Cooperative Act will be brought more into line with the Companies Act. Professor Qalo was made aware of NWC's concerns and will take these into account in making his recommendations. Qalo noted that NWC is now considered a successful "flag ship" of Fiji Cooperative Movement and every effort should be made to accommodate these concerns. The review is looking to the New Zealand Cooperative Act as guide for legislation that would be more suitable for larger cooperative businesses like Natures Way. New Zealand has a number of large and successful agribusiness cooperatives[23]. In New Zealand cooperatives are legally permitted to offer benefit and (limited) voting rights to non patron investors. If these reforms materialize, Natures Way Cooperative (Fiji) Ltd. will be in a position to achieve the best of both worlds, which will include, according to Professor Qalo, a more favourable tax status.

Lyne and Collins (2008) notes that to encourage compliance with standards and to raise the capital needed to finance a value adding plant, many traditional marketing cooperatives in developed countries, such as the US and Canada, have converted to New Generation Cooperatives (NGCs)[24]. NGC's have been found to be particularly suitable to ventures involved in value-added agricultural processing and marketing (Centre for the Study of Cooperatives, University of Saskatchewan). NWC falls into this category. A feature of NGC's is that individuals (members and non-members) may hold higher levels

[23] This includes the dairy giant Fonterra that involved the merger of the two largest dairy cooperative when the New Zealand Dairy Board, was abolished in 2001. Fonterra is a co-operative with over 13,000 shareholders.

of equity through the purchase of investment shares. This would be very appropriate for NWC.

8.4 Opportunities for scale-up and replication- the need for economic feasibility studies

With the completion of the current capital investment program NWC will theoretically have the capacity to treat around 3, 800 tonnes per annum[25]. A realistic maximum capacity is likely to be more in the order of 3,000 tonnes per annum.

With the Fiji fresh fruit and vegetable export industry starting to realise its full potential, treatment requirements may in the not too distant future exceed this expanded capacity.

At AGM held in August 2008 the NWC members endorsed the following resolution arising from 2009-2014 Strategic Plan.

> *NWC make no more investment in treatment capacity. The emphasis should now be on improving the efficiency of operations within the existing capacity and improving the quality and production of fruit coming from the field. NWC also has long term role to play in facilitating market access for new commodities and new markets.*

The argument was that if treatments exceeded 3,000 tonnes, the larger exporters would have sufficient throughput to make investment in their own treatment facilities. The Strategic Plan recommended that Natures Way should encourage such investment. NWC is a business established to service the fruit and vegetable export industry and should not feel threatened by any future establishment of a competing private treatment facility. Such a development would be a measure of the success in being able to encourage sufficient production to justify private investment in quarantine treatment facilities. Competition in quarantine treatment would be beneficial to the whole horticultural export industry – reducing risk and hopefully reducing cost. In the longer term it is conceivable that through its own success NWC could do itself out of a job. However, more likely NWC would continue to provide treatment services for small exporters whose volumes don't justify investment their own facility.

The success of Natures Way has created pressure to replicate the facility in two other locations – one in the remote northern island of Rotuma and the other on the Eastern side of the main island of Viti Levu. These ventures are summarised in annex 4. Neither has been subject to economic feasibility studies and it is highly unlikely that either could be commercially viable, with the throughput unlikely to justify the capital investment. This contrasts markedly to the situation at NWC, where the initial investment and subsequent expansion were subject to detailed feasibility studies.

8.5 An agribusiness more than just quarantine treatment

Natures Way Cooperative's core business has been quarantine treatment. The Strategic Plan 2009-2014 recommended that continue to be the case for the foreseeable future. However, there are opportunities to take advantage of NWC's strategic position to raise funds to undertake other service activities on behalf of the horticultural export industry. Such activities should not undermine NWC's ability to provide efficient quarantine treatment services. The Cooperative has been very successful in accessing donor funding to support

[25] This is based on the following assumptions:

- The treatment facility operates 350 day per year.
- There are two working shifts per day – allowing for two full treatments/chamber/day.

All treatments are under taken in bins, allowing for 3.6 tonnes per chamber per treatment.

the establishment of these service role activities. Examples of such service activity roles and activities are discussed briefly below.

8.5.1 A body representing the needs of the horticultural export industry

NWC has become the de facto body representing the horticultural export industry in discussions with government and with donor and technical assistance organisations. This to a large measure has been a result of the leadership qualities and interests of the current GM. Most recently NWC has become the home of the newly re-established Fiji Fresh Exporters Association. All exporters have to be a member of NWC and use its quarantine treatment facilities. Such a role has become institutionalised and can be expected to continue into the future.

8.5.2 Operating a field service

Provision of an effective field service closely supports the core business of providing quarantine treatment services. Over the last three years a small fledgling field service has been establish with funding assistance from AusAID. The agreement with AusAID was that NWC would fully fund the field service after the period. The field service has proved highly beneficial to the industry despite the tragic death of the first field officer one year into his contract. In June 2009 a replacement field officer was appointed. This field service has now to a degree been incorporated into the Australian Centre for International Agricultural Research (ACIAR) Fiji Papaya Project. The Papaya Project is based as the NWC complex. This four year applied research project greatly enhances the capability of the NWC field service. Some of the activities to be undertaken include:

Sustainable seed supply and variety development

- Reintroduce best practice for collecting seed from superior inbred papaya lines.
- Establish a program for selecting of locally adapted solo sunrise.
- Variety trials in traditional and new growing areas.
- Establishing “certified” commercial nurseries for the supply of seedlings according to best practice.

Crop agronomy

- Performance of papaya under different agronomic conditions.
- Comparison of conventional vs organic planting
- Comparison of irrigated vs non-irrigated planting.

Pest and diseases

- Biosecurity plan for the Fiji papaya industry
- Guide to pests and diseases on papaya in Fiji
- Demonstration plots for the control of phytophthora
- Monitoring program for irregular fruit set, speckled fruit, hard limps and anthracnose.

Supply chain

- Analysis of post harvest loses and causes.
- Post HTFA storage and monitoring of sample cartons
- Sea freight trials

8.5.3 Market access facilitation

Over the last few years NWC has taken on an activist role, which has involved the coordination of market access submissions for papaya and breadfruit for the United States. Donor funding (AusAID) was secured for this purpose. All stakeholders, including the Quarantine Department, have appreciated these efforts. It is recommended that this initiative now be expanded to the coordination of market access submissions to New Zealand. Following the US market access model this requires hiring experienced consultants from the target countries

to coordinate the market access submissions. BAT has recently approved funding for the New Zealand market access work, which will include vi, jackfruit and bitter melon.

8.5.4 Input supplies

NWC has commenced a program of bulk purchase of field crates and papaya seed on behalf of its members. Seed capital to establish a revolving fund for purchase of crates was provided by AusAID. The revolving fund is now self sustaining. This small scale activity has proven highly successful – providing a valuable service to members and a small profit to the business. The importation of crates should be expanded in line with the availability of finance through the revolving fund.

The NWC Board has discussed the possibility of importing other inputs for supply to its members, among the items that have been suggested are: 120 micron plastic, sarlon shade cloth; fibreglass poles, and seedling trays. No action has been taken in these areas. It is recommended that NWC not venture into these areas NWC could play an important role in encouraging the private sector to take up these activities rather than the Cooperative being directly involved.

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10 Annexes

10.1 Annex 1

Gross margin from planting 1 acre of sugar cane (updated May 2009)*

	unit	no of units	rate/unit ($)	total/acre($)
Plant crop				
Land preparation				
Ploughing	application	3	90	270
Harrowing	application	3	60	180
Drilling	application	1	30	30
Sub-total				480
Seed cane	tonnes	5	53.5	268
Land rental	yearly	1	260	260
Fertiliser and agrichemicals				0
Blend A fertliser	50kg bags	2	31.5	63
Blend B fertliser	50kg bags	5	31.5	158
Pre-emergent herbicide	4litre	1	30	30
Post - emergent herbicide	4litre	1	30	30
Sub-total				281
Cultivation				
Tiller	application	3	75	225
Transporation	trip	1	50	50
Sub-total				275
Labour inputs				
Cutting and loading seed cane	person days	5	20	100
Planting	person days	10	20	200
Fertiliser application	person days	3	20	60
Hoeing	person days	5	20	100
Spraying of herbicides	person days	2	20	40
Weed thrashing	person days	10	20	200
Subtotal				700
Harvesting costs	tonnes	45	21	945
Other costs				
SCGC levy	tonne	45	1	45
Drainage and Cane access road levy	tonne	45	2	90
rice advance	yearly	1		240
sugar advance	yearly	1		140
Subtotal				515

10.2 Annex 2: The Value Chain for Fiji Papaya

This value chain summary draws heavily on the Final Report of NWC-FAO Farmer Market Linkage Activity for the Fiji Papaya Industry (2009).

10.2.1 Seedling suppliers

The availability and quality of papaya seedlings is a critical initial link in the papaya supply chain. The Fiji papaya industry has long struggled with this aspect and as a result the NWC Field Service continues to support the industry through the importation and distribution of seeds. It is the intention of the NWC Field Service to continue imports of papaya seed to supply to its smaller farmer members; this is done merely as a service to its members as there is no significant profit arising from these sales. There are six other entities importing sunrise solo variety, these are:

- The Sigatoka Research Station
- The Taiwan Technical Mission
- British American Tobacco
- Bula Agro-Industries
- Produce Specialities Ltd.
- Uno Ltd.

Sigatoka Research Station (SRS)

MPI' SRS has a long history of papaya seedling production dating back to early the early of work of the late Professor Nakasone of the University of Hawaii in the 1980s. The Sigatoka Research Station has withdrawn from large scale papaya seedling production. This is due to a number of factors including; changing government policy, loss of key technical personnel and funding issues. The station continued to produce seedlings on a small scale. SRS has developed a reputation for producing low quality seedlings from seeds collected from surrounding farms.

After the January 2009 flood the SRS was provided with supplementary to continue nursery production. At present the SRS are offering seedlings at a selling price of $0.43 and farmers can apply for a subsidy whereby they are sold on 1/3rd to 2/3rd share cost with the Government.

Taiwan Technical Mission (TTM)

TTM import seed and raise their own seedlings at their demonstration farm in the Sigatoka Valley. Their primary objective is to supply growers who are part of their farming scheme. Scheme members are sold seedlings at a price $0.40 each, with $0.50 paid by other growers. Quality of papaya seedlings from TTM is reported to have improved dramatically over the last two years and the majority of farmers receiving seedlings from TTM are quite satisfied. While TTM have indicated that their papaya support programme will continue depending on political developments.

British American Tobacco (BAT)

British American Tobacco has been recently involved in papaya seedling production. To maximise the use of their nursery facilities during off seasons they have sourced seeds directly from Hawaii and produce seedlings for farmers for $0.50 a seedling. BAT's input have been able to cushion the undersupply problem that farmers were facing. The quality of seedlings produced by BAT is very high, however because tobacco is their core business availability is seasonal.

Bula Agro

Bula Agro is an established private nursery that is involved in raising fruit and vegetable seedlings; primarily to supply farmers in the Nadi district. With a history of consistent quality seedlings Bula Agro have been able to secure contracts with MPI to supply papaya seedlings to farmers who are involved in vegetable and fruit farming. They have been able to maintain a good image with MPI and as a result have secured long term contracts with Ministry of Agriculture. Bula Agro offers seedlings in trays at FJD6.00 (50 plants in a tray).

Produce Specialties Limited (PSL).

PSL is Fiji's leading papaya grower and exporter and have been very successful in raising papaya seedlings for their own commercial farms and out growers. PSL imports all their seed from the University of Hawaii. PSL have recently experimented with direct seeding in their fields which has produced mixed results. It is likely that PSL will continue to produce seedlings for their own farms and for their out growers.

Uno Ltd.

Through a "Contract Growers Agreement" Unois implementing a papaya project in the Natovi Region in the Central Division. This scheme is a test of contractual growing in Fiji without the need or use of land leases whereby indigenous farmers use their land to grow the contracted crops. Uno provides the seedlings at no cost to the farmer. So there is no need for farmers to secure loans to plant the crops.Uno Ltd produces papaya seedlings at a makeshift nursery in Dawasamu which are distributed to four farmer groups in theNatovi / Luvunavuaka area.

10.2.2 Farmers

Sigatoka Valley – East bank and West bank

The Sigatoka Valley contributes to nearly 60% of Fiji's total papaya production. Data collected from MPI research Sigatoka revealed that there are currently a total of 165 registered farmers in this region. Most of these farms were devastated during the January 2009 floods. Post-flood data revealed that 22.65 ha of papaya were newly planted. Baseline surveys indicate that the average farm in this area consists of around ¼ acre of papaya combined with a range of other vegetable crops.

Sigatoka Coastal

The Sigatoka Coastal areas account for 22 papaya farmers. Latest figures from MPI show that farmers along this area have a total of 8.6 ha under papaya. These farms are situated along the main Queens Highway.

Nadi – Lautoka corridor

The latest figures from MPI staff in Nadi indicate a total of 12 growers only in this area. Despite the close proximity to Natures Way treatment chamber there has not been any significant papaya plantings in this area in the last couple of years.

Dawasamu- Tailevu

The area of Dawasamu, Tailevu is the most remote papaya growing location located between the boarders of Ra and Tailevu province. Most of these villagers in this area are subsistence farmers however through a recent "Contract Growers Agreement" with exporter Uno. There are now approximately 20 households involved in papaya production. The exporter has also acquired the services of a specialist agronomist to help out the farmers with seedlings and give technical advice on the best suitable husbandry practices that would suit there humid and mostly damp climate.

10.2.3 Extension partners

Taiwanese Technical Mission (TTM)

The Taiwanese Technical Mission (TTM)is based on the West bank of the Sigatoka River beside the MPI Sigatoka Research Station. TTM are involved with a number of horticultural crops including tomato, capsicum, lettuce etc. TTM have a core demonstration farm and nursery and also engage farmers through training and supply of inputs.

TTM have had a significant papaya component for the last two years and have been influential in raising production levels for papaya growers in the Sigatoka valley and surrounding areas. Equipped with an efficient field service team they service both the West and East banks of the Sigatoka valley which are the main papaya growing areas in Fiji. At present TTM has 9 groups of farmers with a total of 39.5ha of farmland planted to papaya. TTM offer technical training and support as well as a supply of agro inputs to farmers on a micro-finance scheme where farmers are required to pay back the loan when they begin harvesting.TTM aims to increase papaya production and farmer income while generally promoting rural economic development. Their extension model is successful in many respects due to the fact that they visit farmers on weekly basis. They are well financed with good vehicles and an apparent high level of operating capital.

Ministry of Primary Industries – Agriculture Extension Division

The Ministry of Primary Industries – Extension Division has officers located all over Fiji with the objective of providing technical expertise to farmers on production issues as well providing a link to the Government ministries.

The Sigatoka Research Station extension service provides support to papaya farmers in the upper regions of the Sigatoka valley (Keiyasi), the mid valley region (Dubalevu), the lower valley (Bilalevu), the East bank and the cane coastal areas. These are all areas where papaya is currently being grown. Within these areas there are specific locality officers assigned to all the different communities. Locality officers provide services such as farm registration services for farmers intending to export, technical training and farmer field days, farm hygiene and sanitation inspections, technical advice and promoting awareness on post harvest handling and quality management. Despite the fact that they are under resourced due to limited budgets they continue to assist farmers as best as possible.

10.2.4 Domestic traders

There are a number of domestic traders involved in the papaya value chain. These traders have a range of fruit and vegetable crops for sale locally. These domestic traders can be divided into four broad groups;

Roadside vendors

The emergence and growth of roadside vendors in Fiji over the past 10 years has been significant. Roadside vendors basically supply motorists and people who do not have time to visit municipal markets. Due to the very low overheads many roadside vendors sell produce at competitive rates which has led to their success in Fiji.

Many of these roadside vendors will either sell their own papaya or buy from farmers on a per crate basis and then divide them into heaps which are sold for $2-$3. The quality of the fruit is generally not as good as that supplied for export.

Market vendors

Market vendors comprise of both indo Fijian and Indigenous Fijian farmers and middlemen. Vendors either have their own papaya farms or buy it from farmers on a per crate basis either at the market or at the farm gate. The price of papaya selling at the local market is generally higher than roadside vendors, taking into account the stall fees and the transport costs incurred

by the vendor. A heap of papaya at the local municipal market could range from $3 a heap to $1 a fruit.

Middleman

Middlemen usually carry cash with them and do direct dealing with farmers at the farm gate. They have their farmer and buyer contacts and will drive around trying meet orders. It is reported that these middlemen will 'poach' fruit from farmers already contracted by exporters. Since farmers registered to exporters get paid at the end of the month, many farmers are tempted to receive cash in return for papaya meant to be supplied for the export market.

These middlemen will then sell on the papaya to hotels, restaurants, market vendors or supermarkets.

10.2.5 Transporters and handlers

Aside from exporters and middlemen operating their own vehicles, the transport sector of the papaya supply chain consists primarily of informal transporters including lorry drivers, bus drivers etc. These informal actors generally do not consider themselves as part of any supply chains. In the case of the papaya industry where the focus is on the export market with middlemen taking a majority of the non-export fruit there are a relatively few transporters.

NWC Staff

NWC staff has the primary role of quarantine treatment. Due to the Bilateral Quarantine Agreement (BQA) pathway in place for exports, NWC staffs are also involved in the sorting, grading and packing of fruit. NWC staff will handle all of the fruit intended for export at least twice, once prior to treatment and once after treatment. As a result of this system NWC staffs hold a very important handling role in the papaya supply chain and require a high level of understanding of post harvest issues. NWC staffs along with quarantine staff are able to reject fruit unsuitable for export both pre and post treatment. Data available indicates that there is a high level of rejects at the chamber.

Exporters staff

Exporter staff picks up papaya fruit at the farm gate and will be responsible for the transporting and handling of this fruit until it is delivered to NWC. Exporter staff play a critical role in ensuring maintenance of post harvest quality.

Air Terminal Services (ATS)

ATS staff are based at the International Airport and are responsible for collecting the Loading Devices (containers) from NWC and delivering it directly to the aircraft or to the freight companies (in the event of a delay). ATS staff have an important role in ensuring that the containers are collected on time and quickly transferred to the airlines or freight companies. It is reported that there has been a number of cases where whole shipments of papaya have been damaged because ATS staff have left them in the sun for up to 6 hours. It is important that ATS staff understand the nature of the product they are dealing with and as such consider themselves as part of the value chain.

Freight companies

Freight companies will handle an exporter's shipment of papaya when there is a delay between the when the fruit has been packed at NWC and when the airline loads the cargo. Freight companies act on the exporter's behalf to liaise with ATS on what to do with the fruit. Freight companies have cooler facilities where they will hold fruit. As with ATS it is important that the staff at the freight companies understand the specifics of the product that they are handling so that they can make informed decisions on how to manage it.

10.2.6 Exporters

There are nine exporters handling papaya at present. From these nine exporters four handle the majority of papaya exports. A summary of these four export companies is provided below.

Produce Specialty (PSL)

PSL is Fiji's biggest papaya producer and exporter with farm and satellite farmers stretching from the banks of the Sigatoka valley to the cane belt districts of Nadi, Lautoka and Rakiraki. PSL are producing, packing and exporting papaya to New Zealand and Australia. In the past PSL exported to Japan. PSL have advanced to new methods of planting papaya which have resulted in improved quality and higher yields per tree.PSL have now taken the lead in the industry and have adapted to organically grown papaya, due to the unfavourable weather the organic trial had to be abandoned. PSL have recently adopted Hawaii's planting techniqueofdirect sowing. The company currently has 3.6 ha of papaya which were direct seeded on the East Bank of Sigatoka River.

Mahen's Exports (ME)

The Sigatoka Valley West Bank company has been in operation over thirtyyears. ME's are Fiji largest fruit and vegetable exporter. Apart from their ninety acres of vegetable farm land they have invested heavily in out growers around the country to supplement their produce.TheManaging Director attributes their success to spreading their supply source all over the country from the upper reaches of the Sigatoka Valley to the cane belt districts of Nadi, Lautoka, Ba, Tavua and Rakiraki. They also span from to the Eastern Division to the interior of Naitasiri to purchase ginger.

UNO Ltd.

UNO is a recent entrant into the industry. Through a "Contract Growers Agreement" Uno is implementing a Papaya project in the Natoviregionof the Central Division. According to Uno, this pilot project will catapult them to becoming the largest exporter of Papaya in the South Pacific and established the new concept and strategy of "Growers Agreements" in The Fiji Islands.

Rams Valley Fresh (RVF)

Rams Valley fresh is one of the smaller papaya suppliers that has made a name for themselves in the papaya industry. RVF have been in operation for 3 years and in 2008 were awarded "Best Small Exporter of the Year" by the FTIB. RVF currently have a group of nineteen farmers who constantly supply them with papaya, eggplants, okra, chillies, curry leaves and spices for export. The company is based in BilaLevu in the Sigatoka Valley

10.2.7 Fiji Quarantine and Inspection Service (FQIS)

The primary role of FQIS is to strengthen biosecurity and regulatory services to protect Fiji's natural resources to develop for food and income security (improve livelihoods and alleviate poverty). FQIS also maintains Fiji's "Area Free" zone from specific pest and diseases. Their role is also to maintain Fiji's strategic advantages as a relatively pest-free country from high-risk pest and diseases.

FQIS play a critical role in the Bilateral Quarantine Agreement (BQA) which is in place for exports of fruit fly host products. Under this BQA FQIS carry out a number of functions along the supply chain including inspection and grading and eventually issuing the phytosanitary certificate. Rejects are usually on the basis of fruit being too green or too ripe however in the case that a disease or pest is discovered on the fruit it will also be rejected.

FQIS is also the organization responsible for negotiating market access. This area has proven to be a major weakness in Fiji's horticultural supply value chain. NWC's Strategic Plan (2002-

2006) was optimistic that a considerable number of additional quarantine treatment protocols, opening up new products and new markets, would be developed over the Plan period. The program to develop new markets and new products has completely failed. Even the first step in the process, undertaking confirmatory tests, had not been undertaken. The confirmatory test data should have then been submitted to New Zealand and Australian authorities, together with an up to date pest list. The Ministry of Agriculture (FQIS and Research) has failed in meeting its core market access responsibilities. The failure to secure any new market access protocols since 2001 (breadfruit to New Zealand 2001) resulted in a significant loss of revenue to NWC, shareholders and to the nation as a whole.

10.3 Annex 3: Non quarantine treatment services provided by NWC

A field service to improve product quality

NWC Strategic Plan (2002-2006) recommended that a Fruit Specialist be appointed to work with the manager to improve quality and to increase the volume supplied. The scaring of eggplant caused apparently by thrips was identified as the type of problem that should be addressed by the NWC field service. A field officer based at the treatment facility would be well placed to respond to problems as they arise. As a load of fruit comes to NWC and it is apparent that the farmers are harvesting the fruit to early or there is excessive bruising then the field officer and the exporter can immediately visit farmers and assist them to deal quickly and effectively with these quality issues. Relying on the Ministry of Agriculture Extension Service was unsatisfactory. There is a long waiting process before someone is dispatched and there is a chronic issue of availability of transport or fuel for the vehicles.

The role of the field officer was to complement and focus the Ministry of Agriculture's activities in export horticulture. Because of financial constraints it was recommended that this officer be initially seconded from Ministry of Agriculture. The Ministry was supportive of the proposal for a field officer with a coordinating role. However, the actioning of a secondment proved bureaucratically too difficult. The proposal lapsed until mid 2006, when NWC was able to secure funding for an extension officer through AusAID. The AusAID funding is for a period of 2-years, with the understanding that that this fund position would then be fully funded by NWC.

The total cost estimate of the field outreach program for the initial two years was approximately $240,000, of which 59% of the cost was be meet by NWC and 41% by AusAID. From Year 3 onwards, it was agreed that all costs would be borne by NWC.

Mr Luke Tirimaidoka, formally a Senior Quarantine Field Officer, was appointed the NWC Field Officer in July 2007. The focus of Luke's work was on papaya, the identified priority commodity. He made excellent progress in recruiting new farmers into the industry (and new NWC shareholders) and linking farmers to exporters. He began working with the exporters to systematically reduce reject rates at the treatment facility – this included the introduction of outturn analysis and quality defect analysis. With his quarantine background Luke was able to collaborate closely with Dr Armstrong in the preparing the US market access submission. In particular he was able to provide the links between SPC, Fiji Quarantine and Koronivia Plant Protection.

Tragically Luke died at work in September 2008. The work that Luke commenced has now been absorbed in the newly established Fiji Papaya Project and in particular the FAO value chain component, which are discussed below. A replacement field officer, Michael Brown, has now been appointed.

There are important lessons learnt for the first year of experience with the field service. The Field Officer should continue to work closely with the Ministry's extension service, TTM, SPC, Koronivia Plant Protection to ensure that everyone is in line with the direct needs of the industry. This aspect of collaboration is critical for success of this field service because the Field Officer is only one person and cannot possibly meet all the needs of all the members. The officer will need to continue the process of collecting the necessary information pertaining to problems along the supply chain. This will involve responding to a problem on the farm or

pack house and then taking this problem to experts at SPC or Koronivia for answers and recommendations. With answers in hand the field officers can go directly to the farmer or exporter and deliver quick recommendations. Beyond dealing with problems raised by exporters and farmers the NWC Field Officer has the following ongoing objectives:

- Recruiting and advising new members,
- Updating member database and producing ID cards,
- Connecting farmers and exporters and facilitating good trade practices, and;
- Generally working to improve and strengthen the organisation and the links with its members.

The bulk supply of strategic inputs

Field crates

The Strategic Plan (2002-2006) identified the widespread adoption of plastic field crates for the transportation of produce from the field to treatment facility as the most cost effective way to significantly improve produce quality and to reduce reject rates. It was thus recommended that NWC bulk import creates for the distribution to the industry. Having sufficient work capital was a constraint to implementing this proposal. However, in 2007 NWC was able to secure a $40,000 grant from AusAID as to implement this recommendation as part of the extension outreach project.

Initially 1,200 crates imported from New Zealand and on sold at the industry with a 15% handling cost added to maintain the integrity of the funds . All of the revenue generated from these sales was deposited into a specific revolving fund account. As expected the crates were in high demand and were quickly sold. A further 1,700 field crates, with better specifications, were imported from New Zealand at the end of 2008. The AusAID proposal was for funding to import 2600 crates, upon receipt and sale of this next shipment NWC will have achieved this goal. By the end of the period the goal will be substantially surpassed with NWC will continue to import crates using the revolving fund.

The bulk importation of field crates activity has proven that there is high demand for crates to improve the efficiency of handling and to improve quality. This demand does not only come from exporters. It includes farmers and traders who are supplying produce at the municipal markets, hotels, restaurants and retail outlets. NWC is ideally placed to expand this business for benefit of its members and to broaden its commercial base. Sales could be significantly expanded if cost can be reduced. Cost reducing avenues that are being explored are:

- securing a reduction on the 40% fiscal duty that currently applies to importation of plastic crates (on the ground that these are used to promote exports);
- Identifying a suitable source of second hand crates; and,
- Indentify cheap Asian sources (China or Korea) for crates.

Imported papaya seed

NWC has over the last few years has been involved in the importation of papaya seed (solo sunrise variety) from the University Hawaii. The General Manager has established a good working relationship with the seed lab at the College of Tropical Agriculture at UH. This has enabled small qualities to be imported frequently which has ensured freshness and a rate of germination.

In short term NWC has an ongoing role in importing seed on behalf of small farmer members of the industry. However, the emphasis needs to shift toward working with the industry to move away from the long standing dependency on imported seed from Hawaii. There a number of reasons for moving away from this dependency:

- The quality of solo sunrise seed from UH has probably declined over last decade in the absence of any commercial buyers in Hawaii for this seed[26].
- The perceived risk of importing papaya ring spot (PRV) virus (although PRV is not believed to be transmitted by seed); and,
- Most importantly better genetic material can be obtained from selection seed from locally grown sunrise trees that display the best characteristics grown under Fiji conditions.

NWC, in collaboration with ACIAR Papaya Project, now plans to directly involved in the promotion seedling nursery enterprises that source their seed from the best available sunrise papaya trees in terms of characteristics such as red colour flesh, yield and disease resistance.

Facilitating market access

Natures Way Strategic Plan (2002-2006) was optimistic that a considerable number of additional quarantine treatment protocols, opening up new products and new markets, would be developed over the Plan period. This would substantially increase the utilisation of the facility and the viability of the business. To quote the Plan:

The realization of the projections depends on the timely development of new commodities and markets. A long time frame has been allowed for new protocols development, considering the past record in this area. It is hoped that this time frame is conservative and that the exports of some commodities will commence earlier, thereby enhancing NWC's financial results. Regrettably, the program to develop new markets and new products completely failed. Even the first step in the process, undertaking confirmatory tests, has not been undertaken. The confirmatory test data should have then been submitted to New Zealand and Australian authorities, together with an up to date pest list. The Ministry of Agriculture (FQIS and Research) has failed in meeting these core market access responsibilities. The failure to secure any new market access protocols since 2001 (breadfruit to New Zealand 2001) resulted in a significant loss of revenue to NWC, shareholders and to the nation as a whole. By 2008 it was estimated that the annual loss in export earnings is around $890,000 and farmer income about $350,000 (Natures Way Cooperative 2009 p, 16).

Out of frustration of the lack of any progress in the development of new export protocols, NWC has taken on an increasingly active role in this area. Initially this involvement was in the form of lobbying and making representations to FQIS and other government agencies. However, these efforts achieved no tangible results. More recently NWC has taken on itself to become more directly involved the coordination of market access submissions for papaya and breadfruit. NWC used its own resources, complemented by AusAID to acquire the services of Dr John Armstrong (ex USDA) to coordinate the submission of the market access proposal for these two commodities to the United States. He worked with the NWC Field Officer, MAF Quarantine, MAF Research and SPC in preparing and making the submission.All stakeholders, including the Quarantine Department, have appreciated these efforts. It is recommended that this initiative now be expanded to the coordination of market access submissions to Australia and New Zealand. It is anticipated that funding for this work will be secured by the soon to be established AusAID Pacific Horticultural and Agricultural Market Access (PHAMA) Project.

Providing a focus for representing industry views and concerns

The fruit and vegetable growers and exporters have many common interests and concerns. These include: the timely negotiation of export protocols, the consistent application of quarantine regulations, the need for a high level of quarantine surveillance and that research and extension resources are well used. In the past efforts have been made to establish organisations to represent the views and concerns of various agricultural industries. As part of an Asian Development Bank initiative in the early 1990s, a concerted effort was made to

[26] Most of the Hawaii industry uses GMO (resistant to papaya ring spot virus) seed, which is not available commercially. Although it would not be desirable to bring GMO seed into Fiji for marketing reasons. The only commercial user of sunrise seed in Hawaii in on Molakai and he sources seed from his own trees.

establish Industry Councils – this included the establishment of a Fiji Fruit and Vegetable Council. Invariably these organisations could be sustained once donor funding ended. The reason was that these organisation were based on voluntary membership and did not have the capacity to raise there own funding that was necessary to pay secretariat to run the organisations. NWC is unique in that all exporters and producers of fruit fly host export products have to belong whether they like it or not. NWC has the capacity to raise funds through its treatment charges. Natures Way has increasingly taken on the functions envisaged for the Fiji Fruit and Vegetable Council. The NWC bure has become the central meeting place for exporters and for government officials to discuss industry problems and issues. Through these meetings General Manager has been able to facilitate the reactivation of the Exporters Association. The Association now holds their own regular meetings at the NWC bure. Active involvement in market access coordination is an important example of the increasing industry leadership sole for NWC.

Facilitating the expansion of the papaya industry

Papaya has become Fiji's most important fruit export commodity and offers the prospect of becoming a major industry. As a result many new growers are taking up papaya farming. Although there is considerable information on papaya production from around the world this has not been "customised" for use by Fijian farmers, furthermore there has not been any formal research into the issues facing the commercial papaya industry in Fiji. As a result of this lack of sound information with regards to production, harvest and post harvest issues there are serious quality and consistency issues that threaten the long term viability of the Fiji papaya industry. With this in mind NWC prepared an applied research project proposal for consideration by the Australian Centre for International Agricultural Research (ACIAR). The Project entitled "Strengthening the Fiji Papaya Industry through applied research and information dissemination" has now been approved, with implementation commencing in June 2009 (ACIAR 2009). The project addresses the immediate needs of the industry as well as establishing the framework to take the industry forward. The project has been developed and will be implemented in close collaboration with the Fiji Papaya industry through Natures Way Cooperative (Fiji) Ltd. The project will draw upon and collaborate with the experiences and expertise of the papaya industries in Australia and Hawaii.

The primary aim of the Project is to substantially increase the contribution of fruit and vegetable exports to livelihoods of rural people in western VitiLevu. The expected outputs of the project include: a three fold increase in exports of papaya; a doubling of persons involved in the papaya industry; a 50% reduction in culled fruit from the farm; an increase in competitiveness of Fiji Papaya on the export market through the use of sea freight.

Facilitating the establishment new export industries – breadfruit

NWC management identified as a fruit fly host product with excellent export potential. Drawing on research undertaken in Samoa it was concluded that the upper market potential for breadfruit in New Zealand is in order of 1,500 tonnes (Ministry of Agriculture Forests and Meteorology – Samoa). A conservative realistic estimate of the market for breadfruit in New Zealand would be around 500 tonnes annually. Fiji utilising the services of Dr Michael Williamson (Quarantine Technology International) and SPC's Regional Fruit Fly Project was able to secure a bilateral quarantine agreement (BQA) for the export of bread fruit to New Zealand in 2000. The BQA for export of breadfruit to New Zealand is the last Fiji has was able to negotiate.

Breadfruit exports began in 2001 and have hovered around 10 to 15 tonnes annually since then. This growth confirmed that it is feasible to export this highly perishable crop, which has substantial market potential. Breadfruit featured prominently in the NWC Strategic Plan (2002-2006). Exports were projected to reach 100 tonnes by the end of the plan period. However,the performance is well below the identified potential for the crop. It became clear that achieving anywhere near breadfruit's market potential would require concerted effort in two main areas:

- moving from wildharvesting of fruit to growing breadfruit as a crop; and,
- introducing appropriate quality control and postharvest handling procedures.

In an effort to facilitate develop in the these areas NWC secured some funding from the International Finance Corporation (IFC) Pacific Enterprise Development Facility (PEDF). The outputs from this Breadfruit Industry Development Project were:

- A Manual for the Growing and Marketing of Breadfruit for Export agencies. This fifty page pictorial manual represents a culmination of all the various components of the Breadfruit Industry Development Project.

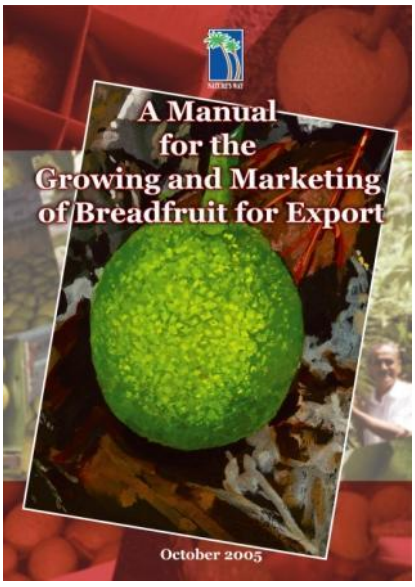

Figure 16 The breadfruit manual produce by NWC

The manual is now being used by Natures Way Cooperative and Ministry of Agriculture extension and research officers in the promotion of the development of the breadfruit export industry.

- *Breadfruit Quality Guidelines Poster*

Posters demonstrating the breadfruit quality guidelines for fresh export have been distributed to various stakeholders and the collaborating agencies. The poster is now being used by Natures Way Cooperative and Ministry of Agriculture extension and research officers to improve the quality of Fiji breadfruit exports. The poster is now being used in conjunction with the Fiji breadfruit export standards that were also established under this Project.

- *Breadfruit Guidelines and Standards for Exports*

The Project developed, in close collaboration with the Fiji industry and importers, a set of guidelines and standards for the export of breadfruit. These guidelines are now being used as the industry standard.

- *Breadfruit Handling and Packaging*

A highly experience post harvesting handling specialist, Dr Grantley Chaplin, provided advice on improving in breadfruit handling and packaging. The various aspects of this work are reflected in his two detailed mission reports, the Breadfruit Manual and Poster and his presentations to Breadfruit Workshop and Conference. Improvements in the handling of breadfruit were starting to become apparent by the end of the 2005 breadfruit season.

- *The engagement of New Zealand importers in the process of improving the quality breadfruit and other products*

New Zealand importers have now been engaged in the process of produce quality improvement through the work of Alan Harre and the resulting follow-up of the NWC general manager. This is reflected in the establishment of the breadfruit market outturn report form, as

a part of the development of procedures for the systematic feed back of information from importers to exporters. Mr Harre continues to provide a link between the New Zealand importers and the Fiji

- *Improved quarantine treatment procedures for breadfruit and products handled by Natures Way Cooperative*

There have been immediate and significant benefits to NWC and its members as a result of Project work undertaken by the Quarantine Treatment Specialist (Dr Michael Williamson). NWC has been able to introduce practical measures to reduce the time required to complete quarantine treatment without any adverse impact on product quality and the efficacy of the quarantine treatment. The treatment time required for breadfruit has been reduced by around 20% (approximately 1.2 hours per treatment). There have also been time reduction realized for other commodities. As a result of Dr Williamsons work, technicalevidencepresented to New Zealand Quarantine that resulted in the certification of an additional Wide Body chamber for commercial exports.

- *The Breadfruit Industry Conference*

The NWC Breadfruit Project culminated in Fiji's First Breadfruit Industry Workshop was held at the Legalega Research Station on June 2006. The Workshop was a joint venture between NWC, the Fiji Ministry of Agriculture and the SPC. The primary purpose of the Conference was to present and receive inputs from Natures Way members and industry stake holders on the drafts of the Manual for the Growing and Marketing of Breadfruit, the Breadfruit Quality Guidelines Poster, and the Export Standards and Guidelines. After providing inputs into these drafts the Conference endorsed the documents for finalization and printing. As a consequence of the Project and the Breadfruit Conference, commercial breadfruit development has been assigned priority by the Ministry of Agriculture. Hitherto breadfruit was a considered as only a minor indigenous crop. Research and quarantine staff were actively involved as counterparts and are now continuing the work as part of their work programmes.

Following from the Fiji Breadfruit Conference was the First International Symposium on Breadfruit Research and Development Nadi, Fiji (April 16-19, 2007). NWC participated in this conference and presented a paper (Stice, McGregor and Kumar).

- *Training*

Project specialists provided training to various stake-holders: NWC management and staff in quarantine treatment protocol requirements and procedures; exporters, quarantine staff and NWC management on export standards; and, in conducing post harvest handling trials.

Facilitating food safety certification to expand exports

One of the key findings of the recently completed papaya market studies was the need to establish quality assurance and food safety certification programs if Fiji is to gain access to growing supermarket market segment. NWC has now commenced the implementation of this recommendation through the securing of technical assistance from the EU/SPC – Facilitating Agricultural Commodity Trade (FACT) Project. The FACT team are now working with NWC management to put into place Good Manufacturing Practice (GMP) for certification at the quarantine treatment and packing facility. This is seen as the first step in HTFA facility acquiring formal Hazard Analysis and Critical Control Points (HACCP) certification. The plan is to extend this assistance out to the interested exporters and eventually to farmers via (GAP) certification.

10.4 Annex 4: The Rotuma and Nausori HTFA Projects

10.4.1 The Rotuma Project

There are four fruit flies present on Rotuma: *Bactrocera distincta*, *B. kirki, B. obscura and B. xanthodes*. Distincta, obscura and xanthodes are found on Viti Levu, while kirki is not. Kirki is a fruit fly of economic importance, having a reasonably wide host range. Thus its migration to Viti Levu would be a major concern, particularly since the NWC facility is not certified for Kirki. As a consequence for the last decade there has been an internal quarantine ban in place on the shipment of all fruit, other than bananas, out of Rotuma. While there is no commercial trade in fruit out of Fiji, Rotuman households no longer have the satisfaction of legally sending fruit to their relatives located throughout Fiji.

As result of this situation the Fiji government provided funding to establish a small treatment chamber on the Island of Rotuma. This unit has the same treatment capacity of the Samoan semi commercial facility (300kgs/treatment). The very limited airfreight capacity out of Rotuma is at extremely high cost and could not be competitive with produce grown on Viti Levu. The promoters are targeting sea freight to the relatively close Tuvalu, with oranges being the initial focus product. This is unlikely to be commercially viable for the following reasons:

- The limited supply of citrus available on Rotuma
- Sea freight to Tuvalu is irregular and infrequent, resulting in the treatment facility standing idle for extended periods. Commercial viability depends on regular throughput as the Natures Way experience has shown.

A far more rational approach would have been to carry heat tolerance work for kirki on Rotuma. This would have involved the establishment of a laboratory colony of kirki (which is still required for the certification of Rotuma HTFA facility) and the use of hot water baths. The data would then be used to obtain certification of the NWC facility for kirki in the event that there is future incursion of this fruit fly to VitiLevu.

10.4.2 The Nausori Project

One of the larger papaya exporters has requested government to fund a HTFA facility at Nausori near Suva to cater for sea freight exports of papaya to Australia. This request has been approved in principle by the Fiji Government through the Agricultural Marketing Authority (AMA). The AMA has in turn asked Natures Way Cooperative to operate the Naursori facility on their behalf. The NWC Board has responded that a decision will based on a thorough feasibility study. A preliminary investigation suggests that the venture is unlikely to be feasible, based on the following considerations:

- The high rainfall areas are not particularly well suited to the production of Solo sunrise papaya.
- There are no longer international flights out of Nausori. Thus, sea freight is the only option.
- A suitable package of practices has yet to be developed for sea freighting papaya to Australia.
- There will be a long lag before there will be sufficient papaya available to make a sea freight shipment.

- A complementary commercial crop for papaya has not yet been identified. For Natures Way in Nadi the complementary to papaya is eggplant. Without eggplant NWC's Nadi operation would have been insolvent long ago.

The consensus is that there will be a long lag between the commissioning and certification of the Nausori HTFA and the time it becomes operational. There will also be extended periods of facility down time. The result will be a significant negative cash flow and the continued operation of the facility will depend on an ongoing government subsidy. Such an arrangement is unsustainable.